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Genesis Vindicated

Seven books by
GEORGE McCREADY PRICE
are now out of print.
The following are still extant:

The Modern Flood Theory of Geology (Revell, 1935), *Modern Discoveries Which Help Us to Believe* (Revell, 1934), *Back to the Bible* (Review and Herald, third English edition, 1932; Japanese edition, Tokyo, 1927), *The Geological-Ages Hoax* (Revell, 1931), *A History of Some Scientific Blunders* (Revell, 1930), *Evolutionary Geology and the New Catastrophism* (Pacific Press, fourth edition, 1926), *The New Geology, A Textbook for Colleges* (Pacific Press, second edition, 1926).

Genesis Vindicated

By

George McCready Price

MINISTERIAL READING COURSE
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"Young men who desire to enter the field as ministers, colporteurs, or canvassers, should first receive a suitable degree of mental training, as well as a special preparation for their calling. Those who are uneducated, untrained, and unrefined are not prepared to enter a field in which the powerful influences of talent and education combat the truths of God's word. Neither can they successfully meet the strange forms of error, religious and philosophical combined, to expose which requires a knowledge of scientific as well as Scriptural truth. . . .

"There is hard work to be done in dislodging error and false doctrine from the head, that Bible truth and Bible religion may find a place in the heart."—Ellen G. White, "Counsels to Teachers," p. 514.

CHAPTER ONE

Clearing the Foundations

I

THE mental quirk of theophobia has developed many symptoms. Not to go too far back in history, it became epidemic about two hundred years ago under the names "deism" and "rationalism," which were an attempt to exploit the Newtonian discoveries in astronomy and physics for belligerent purposes. It next appeared as "higher criticism," and tried to manipulate the authorship and dates of all ancient documents, including those of the Bible. The discoveries of Oriental archeology have now cured those who do not have a pronounced predilection for this pseudo scholarship; but in the meantime it appeared also under the names "development," "progress," and "evolution," professing to account for the origin of the world and man by purely "natural" processes, these being defined as those now taking place all around us, and being due to the inherent "properties" in the things themselves. This modern pandemic form of theophobia, known as "naturalism" or "evolutionism," is now its chief manifestation; but obviously any and all forms of this mental disease are due to the same cause to which Jesus Himself assigned it among the Pharisees (John 8:44), and which some years later Paul described under the name of "the carnal mind." Rom. 8:7.

But some of us who have been watching the changing

scene for three or four decades are now able to recognize another turning point in the conflict. The tumult and the shouting have about died away. After nearly a century of discussion, much of it acrimonious and with much heat and little light, all seems to have become quiet on the evolutionary front. Hundreds of research workers in all civilized countries are still studying the chromosomes of pedigreed fruit flies, of *Daturas,* or of some other form of plant or animal; other hundreds are still ransacking the alluvial deposits of Java and other out-of-the-way corners of the world for some new specimen of *Pithecus* or of *Homo neanderthalensis.* But the old perfervid zeal of two generations ago has long since evaporated; and all the more candid among biologists and geologists now freely acknowledge that nobody knows *how* the wonderful development from amoeba to man really took place. They still stick to the "fact" of development or transformism somehow, but they own that they do not know either *why* or *how.* Yet *naturalism,* or the dependence upon present-day processes to explain all the past, including all *origins,* was the very essence of the scheme of evolution. So, by another queer twist of reasoning, these present-day processes are now being accused of deceiving or double-crossing the investigator; for it has now become glaringly manifest that they will never explain anything about the origin of life, or about the beginning of any important feature of the world.

At this point it would be very natural for us to say, "I told you so." For the author and the publishers of this book have been contending for nearly half a century that no present-day processes, or those we call "natural," can ever be sufficient to explain the origin of anything—because Genesis teaches that the world and all things in it originated by a genuine creation; that this creation was completed at a definite point in the past, and *is not now going on;* and that the Sabbath was given to mankind to commemorate these vastly important facts.

The Sabbath was ordained for much more than a rest day. It was planned by God for the express purpose of keeping ever before us the profoundly important truth that the present-day processes of nature are *not* those of the original creation. The two are entirely different; they are incommensurable. The Sabbath tells us every seven days that creation was an order of the divine activity different from the activity that now prevails in the care of the world and the universe. Indeed, it tells us this great truth every day in the week for those who truly "remember" its purpose. Hence it must always be futile for students of nature to try to "explain" the origin of the plants and animals, or of the world as a whole, in terms of present-day processes. And when the utter failure of evolutionary science to account for origins becomes glaringly manifest, this very failure becomes a demonstration of the truth of an original creation. It is a demonstration by default, but it is conclusive just the same. There is no escape from this logic.

Some of my readers may think it very ungracious to say, "I told you so." If we had based our foretelling on any mere human knowledge, it would be risky indeed to predict how these scientific studies were going to turn out; but when we are depending upon the word of God which has been recorded for forty centuries, we have a right to be confident.

All this assumes that the records of the first chapters of the Bible are to be taken at their full face value, just as they read. For many years a system of pseudo scholarship has tried to mislead the world with the idea that these ancient writings are little better than folklore. This was especially directed toward the historical parts of the Old Testament; but this destructive criticism has now been thoroughly discredited as having been based on unsound assumptions and unscientific methods. Above all, the archeological discoveries made in the Mediterranean regions have re-established the historicity of so much of the Old Testament that even on this

ground alone we now have a right to extend a renewed confidence to the very first chapters of the Bible also, as we shall presently see.

II

It will be in order first to consider just what the first chapter of Genesis really does say, and next to see how modern scientific discoveries are now confirming this record in a very striking manner. Afterward, we may study some principles which follow inevitably from the facts thus learned.

The first verse declares that in the beginning God created the heaven and the earth. We have a right to take this as meaning an absolute creation of the stuff or the chemical elements of which the world and the rest of the universe are composed. We know that much the same chemical elements prevail throughout the entire universe. This record of an absolute creation must be true for the universe as a whole, though I do not think that the record here is dealing with any of the rest of the universe outside our solar system. But the principle is the same for all. It is only whether this record in Genesis is meant to deal with anything outside the abode of man.

A number of years ago, before Sir James H. Jeans had become internationally famous, I wrote him asking if his then recently propounded views about the annihilation of matter did not imply that the universe was originally *created.* Under date of January 8, 1926, he replied (in part) as follows:

"As regards your question, it does not seem to me that the new view of the annihilation of matter has any special bearing on the question of creation. The fact that matter *exists* might equally be said to 'logically and inevitably' involve the idea of an actual creation of matter in some form in the long ago."

This theory of the conversion of matter into radiation is

not as widely used now as formerly to help prove an original creation, chiefly because of the discovery of the "positron" by Anderson in 1931 and the "neutron" by Chadwick in 1932. These recondite phenomena are of course not seen or handled directly, but are inferred from the results of intricate and very expensive technique with the X rays. When first obtained, they were loudly trumpeted as proving the long-sought modern artificial creation of matter out of radiation or pure energy; for this neutron-positron pair are regarded as composing the atom in its simplest form. However, something more than this very slender evidence will be necessary to convince us of the modern artificial creation of matter, just as we have continued to deny the possibility of creating life in a test tube, though the latter has been reported several times within my own lifetime.

Though not now so popular as formerly as evidence for an original creation, this theory of the annihilation of matter is still invoked by some eminent men to explain the eternal vigor of the sun and stars, whose prodigal discharge of energy in the form of radiation has not otherwise been rationally explained. Of course, it is only a theory, perhaps a doubtful theory; yet with two other lines of evidence which will be mentioned in the following chapter, it seems to have helped many people to discard the long-popular heresy of the past eternity of the physical universe, and to believe instead in its actual original creation. Whether this theory about the annihilation of matter has deistic implications will also be discussed later.

Much speculation has been indulged in concerning the *time* when this first verse of Genesis applies. Some have supposed that God created all the substance of the entire universe at one and the same time, though He afterward finished off the different sidereal systems one by one. One cannot find this idea here in the Genesis record; nor can one arrive at it from a study of the scientific facts about the uni-

verse. Certainly we have abundant proofs from the Bible that many beings and much of the universe were already in existence long before this world was created. (See Job 38:7.) To me (though perhaps I may not prove convincing to all my readers) it seems that in this first chapter we are dealing only with the earth as the abode of man, though of course along with this earth there is also involved the rest of the solar system; for it requires all the solar system (not merely the sun) to keep the earth going in its varied motions. At any rate, the wording of the fourth commandment is what seems convincing to me that there must have been an absolute creation, *ex nihilo,* of the material of our earth at this beginning of the six days: "for in six days the Lord made heaven* and earth, the sea, and all that in them is." Ex. 20:11. If we take these words at their full face value, we must believe that the very materials of which the earth is composed were brought into existence *at the time* here spoken of. No other conclusion seems possible.

The second verse says that when first created "the earth was unformed and void" (Jewish version), obviously meaning that at this stage the earth had not taken on the form which it later manifested, and that it was empty of living creatures; for the word "void" means *empty.* These are the only meanings legitimately derived from these two words. Strangely enough, this verse has been made the foundation for what is termed the "ruin" theory, which was first suggested more than a hundred years ago to explain the presence of the fossils, which at that time were alleged to give evidence of an antiquity much greater than the period of man on the earth. This ruin theory, or ruin-and-reconstruction theory, has been revised in our day by the wide vogue of the notes in

* The word "heaven" here used does not mean the sidereal universe; for it is expressly defined in Genesis 1:8 as meaning the *firmament,* or what we would now call the atmosphere, or that part of it which in this antediluvian time divided the "waters which were under the firmament from the waters which were above the firmament." Gen. 1:7.

the Scofield Bible; for some people seem to look upon these notes as of almost equal inspiration with the Bible itself. This theory will be discussed in one of the later chapters of this book. (See p. 291.)

All through this first chapter of Genesis the record is that each successive day consisted of an evening and a morning, like all subsequent days; for the Bible method of reckoning the day was always from sunset to sunset. Another theory was propounded a hundred years ago which would have us regard these days of creation as long periods of time, to make them correspond to the geological "ages," which were then beginning to be popular. This day-age theory was widely taught during the middle and latter part of the nineteenth century, but it passed naturally into the evolution theory of a gradual and continuous development. This theory also will be considered further in a subsequent chapter. (See p. 297.)

It may suffice for the present to say that this day-age theory does not treat the Genesis record candidly or fairly; for the plain, obvious meaning of the context is that the word "day" should be taken in its common or ordinary meaning. Moreover, this theory can never make the periods of creation fit the scheme of the geological "ages," even if the "days" of Genesis are stretched out to any length whatever; for the Biblical record has to be "doctored" or changed in various ways to make it fit these "ages," even when the "days" are stretched out to make them correspond. The glaring inconsistencies that have always remained between the Genesis record and the geological "ages," even when such men as Hugh Miller, Gladstone, and Louis Agassiz had used their procrustean methods upon them, made thousands of scoffing infidels during the later nineteenth century; and these inconsistencies will always stare us in the face, and ought to warn us that we are taking shameful liberties with the word of God.

The Sabbath, too, would be meaningless as the memorial

of a creation accomplished during six long periods of time.

Contrary to the day-age theory and all other modifications of the evolution scheme, which must always have the first forms of life beginning as microscopic forms *in the water,* the Genesis account says that the first things to be created were the various kinds of vegetation *on the land,* even to the fruit trees. This was part of the events of the third day. The sun and moon were brought into visibility and set for signs and seasons on the fourth day. Only on the fifth day were the waters stocked with "swarms of living creatures." Gen. 1:20-22, Jewish version. The birds were also made at this time. The land animals, and finally man, were made on the sixth day. In many important details, this order is quite contrary to the order taught by evolutionary geology.

All the kinds of plants and animals, including man, were formed or created from the materials already made; that is, from the water or the earth. More specifically, it is said that man was formed "of the dust of the ground" (Gen. 2:7), which means that he was created from the chemical elements that composed the earth. In this sense we might speak of the creation of all these living things as a *secondary* creation, since they were not created *ex nihilo,* or out of nothing, as was the case with the earth in the first place. However, as these were the first living things of their respective kinds, and as no one of them came from any previously existing living thing, as they all do now exclusively, their origin is very properly spoken of as a genuine creation. For no subsequently formed plants or animals have been made in this way, but each is now formed from previously existing creatures of the same kind, or "after its kind," as the Genesis record expresses it.

Thus in several ways we find the Genesis record expressly forestalling the scheme of evolution; for God, who sees all things from the beginning, knew what men would do down in these "last days," and how they would invent schemes

after their own lusts, in which they would try to explain away creation as being only like the processes of nature now going on. 2 Peter 3:3, 4. And so He planned the Genesis record in a way that would leave them without excuse, and also in such a way that the last great test of the ages could be made to turn upon this very point of whether the Sabbath would be observed by His people as a true memorial of a completed creation, or men would reject the Sabbath and the record of creation together, and try to explain all origins as only like those natural processes now going on.

III

Right here it may be well to consider briefly the difference between a primary creation and a secondary one. By the first we mean the bringing into existence of things or beings out of the nonexistent, or *ex nihilo,* as the theologians express it. The creation of the earth was of this class. But man and the other animals and plants were not created out of nothing, but out of the elements of the earth and the atmosphere. And yet, since no living things had preceded the first plants, and as man was made out of the raw materials of the earth and not *via* the animal route or from previously existing animals, *all* these creations may in a sense be regarded as true primary creations.

And in a certain sense we may say that God has not since then really created anything *new* in the way of plant or animal life. The unquestioned law of biogenesis, that all life comes now from pre-existent life, is proof that there has never been any interruption in the chain of life by which all the men and women now living can be traced back to Adam and Eve. We often speak of these new generations of mankind and of the animals and plants as *secondary* creations; but in another sense they may be regarded as only a prolonging and a perpetuation of the primary creations, as mere

continuations of those primal forms which God created in the beginning and pronounced "very good."

In a biological sense the propagation of human life and of the life of the animals is not very different in principle from the propagation of a rose or a grapevine or a strawberry. In these latter instances we take a living piece of the plant and place it under favorable conditions, and it just keeps on growing, and in the proper time it becomes an independent plant. Just so with a beetle, a bird, or a human being. Living parts of the ones we call the "parents" are separated from them, and, when placed under proper conditions, these separated parts grow and develop into other beings like the parents. True, there are additional complications. It is by a seemingly miraculous blending of a sperm and an ovum, one from one parent and one from another, that the start of the new being is made (we call this sexual reproduction); while the process used for growing slips from a rose or a grape or a strawberry we call vegetative reproduction. But in essence the process is the same: a new being is made directly from a parent stock. This part of the parent is placed under the proper conditions or environment, and it proceeds to grow and develop into another being like its parents or its one parent, as the case may be.

And all these may be spoken of as secondary creations; but there was only one primary or original creation, namely, the one described in Genesis. All plants and animals and human beings that have appeared on the earth subsequently have been in response to that fiat in the beginning, a fiat which reaches down to our own day—"after its kind."

IV

But in attempting to examine this record of the original creation in the light of modern scientific discoveries, two very important additional facts must be taken into considera-

tion before we can form any safe conclusions. The first of these supplemental or additional facts is the *sin* of man, or his rebellion against God, or what is usually termed *"the fall."* The second is the *flood.* It is manifestly very unfair to ignore these when we attempt either to examine the present behavior of living plants and animals, or to delve among the rocks and dig up remains of prehistoric life. For the fall not only brought sickness and death to man himself, but also brought tendencies to degeneration and perversion of original instincts to the plants and animals over which man had been placed as king. As we examine the developing embryo of man, or of any animal, we recognize many abnormalities and other signs of degeneration; and the primal fall of man and the evil entail which this brought upon the lower forms of life must be taken into consideration when we seek to understand these evidences of degeneration. Also when we find fossils which are unlike anything now living, or find sea shells buried in the strata of the high mountains, or beds of vegetation buried deep in the earth, it is manifestly very unfair and unscientific to ignore the record of the flood, if we profess to be examining the Bible record of creation. We must make a proper allowance for these two outstanding facts in the early history of the world, facts which stand between us and every objective fact with which we can check up the Bible account of the creation.

If we bear these principles in mind, we may be ready now to see in what way we can check up the facts of modern science, in order to vindicate the record of creation, or to see whether some form of the development theory is the more reasonable.

V

How might the great fact of an original creation be proved, or the record in Genesis be vindicated?

It is self-evident that no early human record could do it;

for not even the very first man could possibly know anything about his own creation except as it was revealed to him by God Himself. Still less could he know anything about what had happened before he awoke to conscious life, or came into existence.

The only kind of record that could possibly prove an original creation would have to come from nature itself. Here is something that we can trust, if we can only read the record correctly; for nature itself is from God, and it is conceivable that God Himself might have planned all things in such a way that by studying nature man might himself become convinced of the truth of an original creation.

If all the processes of nature were of the same order, or of the same kind, as the beginning of things; that is, if the present processes of nature were but a continuing or a prolonging of the creation or of the ways by which they came into existence, it would be difficult or impossible for man to recognize any difference. But it is reasonable to think that God planned the present order of what we term natural law to be radically different from those ways in which He started the world and the plants and animals upon it. It is obvious that God, by planning the ordinary processes of nature to go on according to a definite routine of fixed "laws" or regularities, and by beginning the world *in some other way,* might enable man to recognize the difference, and thus by man's own scientific discoveries he might arrive at the understanding of the great primal truth of an original creation, and might thus be led to adore and honor his Creator.

But a good comprehensive acquaintance with nature and natural "law" would be essential on man's part before he could appreciate such evidence, even if it were available. And only in very modern times has any such acquaintance with nature been within man's reach or comprehension. Savages are still on so low a level of mentality that they have no appreciation of any problem about the origin of

things. Even in civilized lands there are some whose minds have dwelt on trivialities so long, or have so long harbored superstitions about magic, or astrology, or the spontaneous generation of life, that they are incapable of understanding or appreciating any evidence which nature might furnish toward the proof of an original creation, or what it should mean to us to be the creatures of a Creator. But in our day this acquaintance with nature has been made available; and it is safe to say that this has been brought about by the providence of God, partly, at least, to enable mankind to understand this important truth of an original creation by the deliberate choice of an intelligent Being.

VI

According to the history of the modern schemes in opposition to Genesis, as well as in its very logic, geology as commonly taught is the keystone of the modern evolutionary arch, the most important part by all odds of the entire theory of the animal origin of man. On this point I wish to quote from Floyd Hamilton,* whose books have done much to establish faith in the Bible. Says Professor Hamilton:

"The theory of successive geological ages stretching over millions of years, with organic life gradually evolving into higher species from age to age, is today the chief prop of evolutionary faith. Other lines of evidence at best are inconclusive, but it is claimed that the fossils offer definite proof that evolution has occurred. The late William Bateson, the English geneticist, brought this out very clearly as follows: 'Contemporary variation certainly may occur; but of the contemporary origination of new species, or of the occurrence of genetic changes which can be tolerably interpreted as likely to lead to the production of incipient species,

* Floyd E. Hamilton is a professor in a Presbyterian college in Pyengyang, Korea. Besides the volume here, he is the author of "The Basis of Christian Faith" (New York: Harper and Brothers, 1933), which is the best textbook on Christian evidences of which I know. I used it for several years in my classes in this subject.

no indication has been found. That the forms of life have been evolved from dissimilar precedent forms we know from the geological record, but as to the process by which this evolution has come to pass we are still in ignorance' (Art., "Genetics," Encyclopaedia Britannica, 13th edition, Sup., Vol. II, p. 165). It is thus seen that the faith of present-day evolutionists rests principally upon the truth of the evolutionary interpretation of the geological record."[1]

Similarly Thomas Hunt Morgan has said:

"The direct evidence furnished by fossil remains is by all odds the strongest evidence that we have in favor of organic evolution."[2]

And of course, Morgan is here referring to the supposed graded series of once-living things furnished by the successive geological "ages."

J. W. Judd expresses the same general idea of the crucial importance of geology for the theory of evolution in a historical way:

"Were I to assert that if the 'Principles of Geology' [by Charles Lyell] had not been written, we should never have had 'The Origin of Species' [by Darwin], I should not be going too far: at all events, I can safely assert, from several conversations I had with Darwin, that he would have most unhesitatingly agreed with that opinion."[3]

Over and over again, in his notable lectures before Princeton University, Dr. Louis T. More emphasized the fact that the ancient Greeks could never have had any such theory as that of organic evolution, for they knew nothing of the fossils which furnish the only possible outline on which to construct the history of life in a supposedly reliable sequence; so that a credible theory of evolution was only possible in very mod-

[1] Floyd E. Hamilton, "The Basis of Evolutionary Faith," pp. 193, 194. London: James Clark & Co., Ltd., 1931.

[2] Thomas Hunt Morgan, "A Critique of the Theory of Evolution," p. 24. Princeton University Press, 1916.

[3] Quoted by A. Schuster and A. E. Shipley in "Britain's Heritage of Science," p. 279. London: Constable & Co., 1917.

ern times, or after the "historical" order of the fossils had been firmly established. I shall quote only one statement to this effect:

"The fact that a knowledge of prehistoric or paleontological fossils is necessary as a positive foundation before evolution, in its modern sense, would even be guessed, seems almost self-evident. Without the evidence that types of fauna and flora once existed different from those existing now, what possible ground could there be for picturing a gradual succession of changing forms? . . . If Darwin was so worried because the record is imperfect, is it likely that he would have thought it worth while to advance his theory, or would he even seriously have considered it, if he had had *no* paleontological record?"[4]

This quotation ought to clear up the relative importance of geology and Darwin's theories of biology in the establishment of the theory of evolution. I think most of my readers will see the point. But as this book will probably fall into the hands of some who may not have been accustomed to strict logical processes, I wish to say right here that the problem of the origin of species is not the chief point in the evolution theory. This idea is widely held; but it is not accurate. Darwin made the problem of the origin of species the title of his famous book, but Darwin was only trying to finish off the theory of organic evolution. He took that theory for granted, and simply tried to show *how* the process of transforming one kind of life into another might have come about. The French, who are a keenly logical people, call Darwin's theory "transformism;" they reserve the term "evolution" for the larger question of how all the present kinds of plants and animals have developed from unicellular beginnings; and of course for this the history of the fossils is all-important.

In other words, all the chief arguments for evolution in

[4] Louis T. More, "The Dogma of Evolution," p. 61, note. Princeton University Press, 1925.

the larger sense were developed before Charles Darwin; they had been built up by such men as Lyell and Agassiz. Darwin simply tried to complete the theory by supplying its supposed *cause*. The quotations just given ought to make this point clear.

VII

That in the last days the focus of divine publicity would be turned upon the subject of creation and the vindication of the Genesis record, is clearly seen by a consideration of the prophecy of Revelation 14:6, 7. The figure here used is that of an angel flying in midheaven with a message for the entire world, calling upon men everywhere to worship the Creator. Doubtless real angels will assist in this work. But the chief idea seems to be that the Spirit of God will be active in inducing all people to become interested in this problem of the making of the heaven and the earth, thus directing their minds toward the inescapable right of the Creator to command the allegiance and obedience of all His created beings. Hence we may be sure that the modern widespread interest in the problem of creation is of God. And the present volume is a contributing part in this work.

But the other parts of the prophecy associated with these texts show that there would be extensive opposition to the proclamation of this truth about creation. The worship of the beast and his image is placed in direct contrast and opposition to the worship of the Creator. We know also that the vast majority of mankind have never been obedient to the commands of God. Hence we might expect that the efforts of the Spirit of God to bring the truth about creation to the attention of the world would be perverted and misunderstood. When the Father on one occasion spoke audibly from heaven in attestation of the mission of Christ (John 12:28-30), the unbelieving multitude standing by said that it had thundered. This was all that they understood of God's message. Simi-

larly in our day, when God, by a thousand scientific revelations, has sought to bring this subject of creation to the sober consideration of mankind, the great majority are so twisted in their thinking and their methods of reasoning that they hear "evolution" instead of "creation." In other words, they misinterpret God's message from nature until it means to them that the present-day "natural" processes have always prevailed, and that these "natural" processes are sufficient to explain how all things came into existence in the first place.

And all this fits into the picture given in Daniel 12:4. This prophecy, given twenty-five centuries ago, says that in the last days many would be running to and fro, and knowledge would be increased. It probably refers more especially to an increased knowledge of God's word as given in the Bible; but it very obviously includes also an increased knowledge of God's oldest testament, the book of nature. However, an increased knowledge of nature on the part of sinners and reprobates has obvious dangers and disadvantages. Machine guns, armored tanks, and aerial bombs are quite as truly characteristic of this last-day increase of knowledge as are the radio and the automobile. Even the latter are far from proving an unmixed blessing. And in the field of the study of ancient languages, or in the study of animals and plants and the fossiliferous rocks, the modern increase of knowledge on the part of men afflicted with theophobia has resulted in the fantastic fables of the radical "critics" of the Bible, and in the hideous effigies of "primitive man" which confront the millions of school children who visit the scientific museums of the entire civilized world.

Obviously the efforts by God to enlighten mankind regarding this matter of creation seem to be largely negatived or misunderstood. Most people merely hear a sound as of thunder; they do not understand the message. As the angel said to Daniel: "None of the wicked shall understand; but they that are wise shall understand." Dan. 12:10, A. R. V.

But it is in 2 Peter 3:3-7, that we find the clearest statement of the style of argument employed by the modern unbelievers in creation, with a divine answer to their methods of sophistical reasoning. The apostle places the whole affair in the setting of the last days, and says that the enemies of God make a mockery of the idea of any catastrophic end of the world at the second coming of Christ, grounding their unbelief on the scientific doctrine of *uniformity,* past, present, and future—"all things continue as they were from the beginning of the creation." In other words, these last-day people think they are acquainted with all the laws of nature, and especially with the past history of the globe, and they take their stand squarely on what they claim is the absolute uniformity of nature. There never has been any world catastrophe in the past, so they say, and hence there will never be any such event in the future. They claim to know all about the past and the present, and thus they confidently predict what the future is to be.

Those who are at all familiar with the methods of reasoning employed by modern evolutionists and skeptical philosophers will marvel at the accuracy of Peter's delineation of their views. For the very essence of the evolution philosophy, as we have seen, is that the present is the measure of the past, and of all the past. With the advocates of this theory, their scheme of evolution is simply a consistent extension of what are termed the laws of nature to cover everything in the past and also in the future. This not only rules out all miracles, and especially such a large-scale miracle as an absolutely universal flood, but it also rules out any such miraculous beginning of things as a literal creation; and of course from all this there can never be any such catastrophic end of the age as the second coming of Christ. The marvelous accuracy of this picture of the scientific philosophy of our day shows that divine wisdom must have been behind the writing of the fisherman of Galilee nearly two millenniums ago.

This is the undoubted meaning of the curious language which Peter attributes to these last-day mockers, that "all things continue as they were from the beginning of the creation." In other words, they deny that creation itself was anything different from the processes of nature which we see all around us, and say that the present order of nature can be extended back to the very beginning of things. All differences between creation and the present processes of natural law are smoothed out, according to them, and the past is made like the present in all essential respects. And this is the very essence of the evolution philosophy.

But as we have seen above, the Bible is opposed to such an idea. It declares that creation was radically different from the present processes of nature. For the record is that at the end of the creation, God "rested," or ceased from the progressive steps of creation week. And the Sabbath was given to the human race as a memorial of a *completed* creation. It was meant as a perpetually recurring protest against any theory that creation was similar to the processes of nature now going on.

In other words, the weekly Sabbath is a divine protest against the very essence of the evolution theory. And its timeliness for our day grows on our minds as we study such passages as this one from Peter, and as we consider how the original record of creation may be vindicated in our day in the very face of this world-wide denial.

But Peter's method of answering these last-day evolutionists is equally appropriate and equally instructive to God's people today. For he quotes the record of the flood as proof that the evolutionary scheme of uniformity has not prevailed in the past; one great world catastrophe was brought about by God in the past, and hence we may well expect that another world destruction will take place in the future, this time by fire instead of water. And as we shall see in subsequent chapters of this book, the interpretation of the fossiliferous

deposits as having been caused by the flood is the only effective answer to the sophistical arguments of the evolutionary geologists.

VIII

It is well worth while for us to consider a little more closely this divine statement that creation was completed at a definite point in the past, and thus was radically different from those processes of "natural law" by which God is still managing and conducting the world and the universe. As we have seen, the Sabbath was given to mankind to keep this distinction constantly before us.

But why did God plan thus to make creation different from the processes which He would subsequently employ in the form of those regularities which we term "natural law"?

We may rest assured that it was no arbitrary action on the part of the Creator, but that it has a reason behind it which is of significance for us today. And it seems evident that the reason for planning this difference is to be found in the fact that God foresaw the possibility of the entrance of sin into this world, an event which at once marred what He had made, first by changing man's mental and moral attitude toward his Creator, and secondly by resulting in degeneration, suffering, and death, which God in His wisdom saw would be for man's ultimate good, and would assist in God's plan of redeeming man from sin and from its consequences.

By its reflex influences sin also brought profound changes in the natural world. The curse upon the ground recorded in Genesis 3:17-19 was a symbolic expression of profound and multiplied changes in both the physical world and the world of plants and animals which were thus initiated, designed for man's good, of course, but of such a nature that afterward it would be fatally wrong to judge of the original creation by the world as we now find it. God's character of perfect love could have been read from the original creation,

but not now, with this marring of the face of nature, and the suffering and cruelty and death which have ever since man's sin prevailed throughout the world. Thus it is quite unfair and leads to inevitably wrong conclusions for us to judge of the original creation by the present order of things, unless we take this perverting and deforming fact of sin into account.

But after a certain number of centuries there came the further changes as the result of the flood and the very profound transformations in the face of the earth which were thereby effected. Climate and topography were radically changed, and many types of animals and plants wholly disappeared from the face of the earth, and are now known to us only as fossils. Some plants and animals now found in various parts of the earth may even be considerably different in outward appearance, as many of them are certainly different in habits and instincts, from their divinely created ancestral types which God in the beginning pronounced "very good."

John Woodward (1665-1722), the first writer on the flood as the cause of the geological changes and the burial of the fossils, has expressed very well the changes which the flood produced and the reasons for them:

"The first earth was suited to the first state of mankind; who were the inhabitants of it and for whose use 'twas made. But when human nature had, by *the fall,* suffer'd so great a change, 'twas but necessary that the earth should undergo a change, too, the better to accommodate it to the condition that mankind was *then* in: and *such* a change the deluge brought to pass."[5]

Thus the flood, by the profound changes which it effected in the earth, has also come in to mar the creation which God originally made. And it, too, must be taken into account when we attempt to judge the past by the present, or to judge

[5] John Woodward, "An Essay Toward a Natural History of the Earth," p. 98. London: Printed for R. Wilkin, 1695.

of the original creation by what we see prevailing in the world around us.

In all these multiplied ways it is manifestly unfair to judge of God's character of wisdom and benevolence by what we see in the world today. And all these reasons help us to see the wisdom in God's plan of making the original creation *a finished work,* radically different from the processes of nature by which or under which God now manages and conducts this world and the plants and animals upon it.

And this distinction between present-day natural law and the original creation is one of the facts which the Sabbath was designed to commemorate. This meaning of the Sabbath is of special and profound importance for us today, in view of the all-prevailing falsehood of the evolution philosophy, which in essence is based on projecting the present backward into the past and attempting to "explain" the origin of everything in terms of present-day processes and laws.

In the minds of those who have thought long and carefully upon these subjects, the conviction has been formed that one of the chief objects planned by Providence in the greatly increased knowledge of nature now available for mankind, has to do with this very subject of vindicating the record of creation. Of course, other results are also in the divine program, such as the speedy giving of the gospel to all the world. But the Sabbath was given to mankind to remind them of creation, and to keep before them the everlasting distinction between the present regime of natural "law" and the original creation; and a renewed proclamation of the Sabbath has been planned for the last days, just preceding the second advent. All this is in the modern setting of a greatly increased knowledge of nature, along with the almost universal acceptance of the evolution philosophy. So that, as a final test for all mankind, preliminary to the closing of the long drama of sin, God might ask the whole human race to decide between the acceptance of His Sabbath, with the

acknowledgment of His overlordship as our Creator, and the virtual rejection of Him as Creator by the rejection of His divinely appointed Sabbath.

Such is the issue that is before the world today. And it is self-evident that anyone who professes to accept the Sabbath ought to take a deep interest in all the many scientific proofs which are now available to help vindicate the record of Genesis. For this vindication of Genesis can come only through nature, and can consist only in showing the difference between present-day natural "law" and the original creation. These differences constitute the only possible vindication.

IX

This brings up the subject of why we need the Bible in these days of increased knowledge. Many think that because of modern progress, we do not need the Bible as much as our ancestors needed it. On the contrary, we need the Bible vastly more than men needed it in the early days of the world. We need the Bible, not because of a lack of knowledge, but because of so much knowledge falsely so called. For as a certain American humorist used to say, it is better not to know so much than to know so many things that are not so. In the early days of the human race, the larger aspects of nature spoke very directly to men and women, somewhat as they speak even today amid the mountains, on the open prairie, or on the ocean. In the great open spaces of that early world God could and did speak directly to the human heart, and the Holy Spirit could set home to the individual many lessons which it is now almost impossible for one to learn amid the multitude of distracting voices which call from every side. Accordingly, man needs God's written instructions far more in these days than he ever needed them before.

The evil one has never been able to do very much with

unmixed falsehood; it has always been a mixture of good and evil with which he has deceived the race. And so in these days, when the providence of God has mercifully planned for men to learn many real truths from nature, the master deceiver has given many false twists to these modern scientific discoveries and inventions, which seem to give false ideas about God and about His management of the universe. Thus these modern discoveries, as interpreted by men who are out of touch with God and His truth, become a mixture of good and evil. Hence the Bible is needed far more today than ever before, for only in the Bible do we find truth unmixed with human speculations and human falsehood.

X

Every true teacher—one who is not a mere purveyor of information, but who is concerned with the mental and character development of his pupils—is constantly confronted with the problem of how much he is to tell them dogmatically, and how much he is to leave them to find out for themselves. Discovery by oneself is the best method of having truth impressed on the mind; but the effort to discover a truth must not be out of all due proportion to the benefits thus gained. And many important truths are absolutely beyond anyone's power to discover.

When the Great Teacher undertook the redemption and education of the race of mankind, He was similarly confronted with the same problem. How much was He to tell us? How much should He leave us to discover? In direct revelation to the early men and women, and in the recorded instructions in the Bible, we have what He decided to tell us; in nature and in personal experiences we have what He has let us discover for ourselves. I need not here dwell on the fact that some complain because they think He told us so much; they think themselves capable of finding out every-

thing by the "scientific" method. But the fact is, they never could have discovered the details in regard to the original creation in any other way than by a divine revelation. No human being, not even the first man, could have had any personal experience or observation of creation. All that Adam had before him were the *results,* the things that had been created; and how could he learn from them anything about their origin? If he had become familiar with what we term natural law among plants and animals, and had projected this natural law backward into the past, he might have worked out some scheme of natural development or evolution, as has been done in modern times; but he never could have discovered anything about the details or the order of creation. Nor could he possibly have discovered anything about the length of time involved in the original calling into being of the different orders of plant and animal life. All these details must necessarily have been a matter of direct revelation.

There is one way and one only in which the discoveries of science can confirm the record of creation. By a sufficient acquaintance with the processes of nature that now prevail in the heavens above and in the world of plants and animals around us, we might become convinced that these processes are in no way sufficient to tell us how the world and its inhabitants came into existence in the first place. We might become convinced that their beginnings must have been something different, that they must have had an origin by an event which was *sui generis,* a completely unique event, in no way comparable with the processes of nature now going on.

True, this would be only a negative demonstration; it would be judging of the origin of things solely by our failure to explain their origin in terms of the present laws and processes. But this is the only possible way in which any human beings could arrive at scientific facts which would confirm or vindicate the truth of creation. And such a vindication of the record of creation could be arrived at only after

a wide acquaintance with the laws and processes that now prevail in the natural world. But just such a vindication of the Bible record of creation is now available through modern discoveries. And the present volume is designed to explain the details of this vindication.

XI

No enlightened Christian can for a moment suppose that the greatly increased knowledge of nature which the world has seen during modern times has come about by mere chance, or by the unaided cleverness of man. But in the light of recent developments it is easy to see why God did not allow this greatly increased knowledge of nature a thousand or two thousand years ago. As I have already remarked, there is a dark side to the picture as well as a bright side; for submarines and aerial bombs, to say nothing of the clever tricks of the gangster, are as much the product of modern science as are the automobile and the radio. And since man is what he is, a fallen being, it would not have been for the best of all concerned if this increased command over the forces of nature had been allowed to take place in the days of ancient Greece or Rome. What would the race be like today, if the ancients had acquired a command of these modern discoveries and inventions?

Man being what he is, it was inevitable that grossly wrong interpretations of nature would arise; for theophobia is not cured by merely acquiring skill in the technique of the test tube, the microscope, the clinometer, or the interferometer. His theophobia is bound to work up intellectual defense mechanisms against the divine lessons which naturally come to any soul who thus gains a close-up view of the works of the great Creator. Accordingly, we may look upon the modern spread of the evolution philosophy as an almost inevitable by-product of man's mind, if God were to allow and foster

the greatly increased knowledge of nature which we see prevailing in our modern world.

But there are other aspects of the situation which are sometimes overlooked. Science is supposed to be equivalent to knowledge, but, owing to the extreme specialization now necessary in every department of modern science, its professional followers have already become men of faith instead of men of knowledge. For the total field of natural science has become so vast, its study has become so completely divided into specialties, that the investigators in one field are obliged to take on sheer faith the results attained in all other fields except their own. No human mind can ever hope to know at first hand more than a moiety of the details that have been discovered in nature.

Thus even the most accomplished specialists in science are only laymen in all other branches of science except their own. Accordingly, for all that general view of the world which is so much paraded before mankind as the results of "modern science," such as the theory that man is descended from a long series of prehistoric animals during a period of a thousand million years, any and every man who teaches this theory is taking by sheer faith probably ninety per cent of everything which such a theory involves.

As I have expanded on this idea in the final chapter of my "History of Some Scientific Blunders,"[4] I need not dwell further on the subject here.

But it is important to remember some of the rules of evidence, rules which are just as true and just as important in science as in law, where they first originated. One of these rules is that one must never base an inference on another inference. It will never do to pyramid inferences on one another; every single conclusion must be proved independently by direct facts. Another rule, so often violated by

[4] New York: Fleming H. Revell, 1930.

biologists and geologists, is that the total collection of facts from which an inference is drawn must not only be wholly consistent with the truth of that inference, but must also exclude the probable truth of any other inference.

A little acquaintance with the way in which the modern theories in opposition to Genesis came about, will show anyone that many eminent men concerned in building up this opposition either never heard of these rules, or they thought that they as scientists dedicated to the sacred cause of pure "truth" were exempt from any such mundane rules, which are only for "lesser breeds without the law." For what a pyramiding of unproved inferences and of sheer faith in the dicta of others is represented by any man's acceptance of the theory of organic evolution in opposition to creation.

What Louis T. More so aptly calls "the dogma" of evolution has been slowly and gradually built up through several generations on sheer faith in the dicta of a few men reputed to be experts or specialists, each of these in turn building on the private opinions or prejudices of a few others, very much as the people of the Middle Ages trusted the salvation of their souls to the priests, the latter trusting to the bishops and the cardinals, until in the last analysis the ultimate object of their faith was the pope, as the objectified symbol of that abstraction "the church." Today it is "modern science" to which millions of people are entrusting their faith and their souls; and this modern superstition is no better than that of a thousand years ago.

Thus Louis T. More, in a recent article, points out how "modern science" is fast creating a situation which, while supposedly the exact opposite of the domineering intellectual despotism of the Middle Ages, is no less dangerous in a practical way. He puts the matter in the form of a question:

"Because of our present obsession for science, is there any danger that we may, in our quest of power, of health, and of comforts, create an antipodes to the Middle Ages; submit blindly to the

scientist instead of to the priest, and to the dogmatism of the laboratory in the place of the church? If we should continue in this worship of science, will society be healthier or nobler?"[7]

Yes, an antipodes in outward form, but not in spirit. If the power that reigned during the Middle Ages was the leopard beast of Revelation 13:1-10, how can we avoid the conclusion that this modern power, so absolutely world-wide in its control over the minds of men, and so completely anti-Christian in its every doctrine and character, is yet to have a large part in the making of the "image of the beast," as spoken of in the rest of this same chapter?

XII

From all this it is evident that an original creation might be discredited or disproved, if it could be shown in a scientific way that the present orderly ways of nature are sufficient to account for the origin of everything. Such is the basic idea behind the evolution philosophy. This is the idea that man has grown up in a natural way from some of the lower animals; that these animals have existed on the globe for uncounted millions of years in a slowly changing and developing sequence; that the present more or less orderly processes of geological change are sufficient to account for all the vicissitudes recorded in the rocks by the burial of the fossils; that back at the beginning of the world there must have been something in the way of spontaneous generation of one or a few of the first and lowest forms of life from the inorganic; that back of all that, the earth itself must have probably started as a mass of hot rock and flaming gases torn off from the sun in some cosmic process not materially very different from somewhat similar events now supposedly taking place in distant parts of space.

[7] *The Hibbert Journal*, January, 1939, p. 272.

Such is the modern theory opposed to the Genesis record of creation. It takes on innumerable variations in the hands of its friends and advocates, and every stage in the process may be modified in such a way as to seem to bring God into the picture, or the entire development process may be attributed to God, and this *theistic evolution* may be made into a modernistic religion, so common and fashionable today. But for the great majority of human beings who have not stultified their reasoning faculties, the natural result of the evolution philosophy is that the universe is very much like Huxley's suggestion of "a mud pie made by two blind children, Matter and Force," and we all might as well have a good time while we can, for we are sure to be a long time dead.

On the other hand, the Genesis record of creation might be vindicated by showing that the net results of all modern science tend to prove that the processes of nature now prevailing, or what we know as natural "laws," are utterly unable to account for the origin of man, or of any of the original forms of life, or of the world itself; and hence the origin of all these things must have been by some method radically different from the processes now going on around us. And this vindication ought to be of sufficient clearness and sufficient cogency to convince all who do not exercise the determined will to disbelieve, or who are not afflicted with the theophobia alluded to in the first part of this chapter.

This indicates the general plan which will be followed in the present work. Unthinking persons may expect too much in the way of such a vindication. But in the very nature of things many of the details of the Genesis account can never be proved by scientific discovery and must always be matters of faith. There must always be many points of detail which we can believe but cannot prove, to use Tennyson's expression. For instance, it must always be a matter of faith that the grass, herbs, and fruit trees were created before the animals of the waters, and that the birds were made before the ordi-

nary land animals. These details and many more are quite beyond any imaginable proofs from modern scientific discovery. The same is true with regard to the length of time occupied in the work of creation, whether it was six days or a hundred days. All these things we must take on faith; and by our remembrance of the Sabbath we proclaim to God and to the world that we believe what God has revealed on these matters.

Obviously God *could* have spoken all the animals and plants into existence at one and the same time, and thus not occupy any recognizable period of time for the work of creation. But in His wisdom He chose to spread out the work over a period of six days, and then set apart the seventh day for mankind perpetually to remember and meditate upon this original work of creation. And all this is now being again brought out before the people of this generation, so that they can choose to worship the Creator of the heavens and the earth in a manner appropriate for the time of the world in which we are now living.

XIII

To sum up the line of thought which will be followed in this book:

1. The favorite line of argument of modern science is to explain the origin of things as being the result of "natural law," and to say that therefore God was not directly concerned in creating them. This is the very essence of the evolution philosophy. But the bringing into existence of the stuff that composes the universe is, as a recent writer expresses it, "an act for which there can be no formula,"[1] and hence is a work that only God can do.

2. The same general line of evidence applies to the origin of the plants and animals and also man. The great funda-

[1] "Evolution in the Light of Modern Knowledge," p. 452. London: Blackie & Son, Ltd., 1925.

mental law of biogenesis, or that life comes only from pre-existing life, is prima-facie evidence that something of the order of a literal creation must be believed in as the way in which the first forms of life came into existence. Nothing that resembles the origin of life from the not-living is known to modern science, either from wild nature or in the laboratory.

3. The great groups of animals called the phyla (singular, phylum) are all so radically different from one another that no one can imagine how they can be related to each other. This separateness of the different types, with no intergrades or intermediate forms between them either living or fossil, is almost equally true of the great classes and orders into which the phyla are subdivided. No transformism of any one of these into any of the others can reasonably be imagined; hence a great many distinctly different kinds of life must have been created in the beginning. Just how many distinct kinds were thus created must always be a matter largely of personal opinion, so far as mere science is concerned; but it is reasonable to take the record in Genesis just as it reads. For it is abundantly clear that to suppose that all the many different forms of life could have developed from one original cellular form, is just ignorant superstition, and nothing else.

4. Any scheme of organic evolution must have a supposedly reliable *history* of living things in a *graded series* before it can be made even moderately reasonable. Hence evolution must have time—many, many millions of years—in order to show that certain kinds of life *lived long before others.* Hence the very great importance of the evolutionary scheme of geology for making organic evolution reasonable, as opposed to the simultaneous creation of all the original forms of life. In ages before this supposedly reliable science of the fossils was known, no scheme of evolution was even thought of or could be thought of; and this is the reason why

the ancient Greeks, heathen though they were, and believers in spontaneous generation, never really thought out any such scheme of evolution as has appeared in modern times.

5. From all this it follows naturally that an absolutely new and unique situation has arisen in our modern world, so far as God's gospel work is concerned. Never before in all the centuries of time has there been a definite and detailed scheme of explaining away the things of nature in direct contradiction to the record of creation given in the Bible. Accordingly, God's message of redemption in this preadvent period must place strong emphasis on the truth of creation, and must also understand and proclaim the divine memorial of this creation, the Sabbath of the fourth commandment. Never before in the entire history of mankind were these truths more timely as a vital part of the gospel message. But in order for God's people to present an adequate and well-rounded message in regard to creation (Rev. 14:7), and in regard to the timeliness of the Sabbath and its full significance for these days, they must familiarize themselves with the truths now available from God's oldest testament, the book of nature.

Such are the aims and the methods of the present book.

CHAPTER TWO

Our Father's House

I

AS we need a mental springboard from which to take our leap into the mazes of cosmological speculations which we plan to explore, we may find it in a very sensible caution given in a review of a book on the origin of things in *Nature* of a few years back. The editor says that the authors of this book, and all others—

"should be warned against basing theories on current astronomical descriptions of the origin of the solar system, or of the galaxy, which are usually tentative and have a habit of changing completely within a decade."[1]

Certainly there cannot be much scientific finality about theories which "have a habit of changing completely within a decade."

With this caution ringing in our ears, we are not likely to take very seriously the perennial crop of speculations about the origin of the universe, though this same caution may encourage us to prize even more highly any reasonable and candid criticism of the current fashionable theories, especially when these criticisms come from eminent authorities. In other words, the cat may look at the queen; we may be able to judge of the *weakness* of a theory, even though we may

[1] *Nature*, December 9, 1933, p. 876.

not feel competent to formulate a substitute. For after all, in the words of the canny Scots minister, "We have had no experience in the making of worlds." And as science apart from experience must always be sheer guessing, our entire lack of experience in the making of worlds or even in watching them being made, is sure to vitiate any speculations which people may feel free to make along this line.

There was a time when speculators used to think that the nebular hypothesis of Kant and Laplace was adequate to explain the origin of the solar system. This was the astronomical mental background of Darwin and the nineteenth-century evolutionists. The rest of the sidereal universe was ignored, and they were satisfied with a childishly simple story of the condensation of the sun and its family of planets and attendant satellites from a mass of whirling vapor. Nobody now takes this speculation seriously, and not very many have any better opinion of the planetesimal hypothesis which followed and had a vogue of a few years.

The wonderful progress within recent years in astronomy and astrophysics has rendered puerile any theory of cosmogony which deals only with our solar system. To have the respect of intelligent men, it must take in the entire universe. To explain the origin of the solar system alone, while ignoring the thousands of millions of other suns, would be like formulating an entire system of botany from the flower in the crannied wall, while ignoring the forests of the Amazon and the Congo, and all the rest of the plants between the tropic and the pole. Accordingly, cosmogonists have had to take into account some study of the uncounted galaxies of suns scattered through space.

But this has its difficulties. For if we have had no experience in the making of worlds, still less have we ever observed the making of galaxies, and cannot even imagine any method of their making or their development. And so the fancies of the speculators have rebounded or recurved in-

wardly; and the world has had a plethora of speculations about the structure of the atom, with theories of its sometimes disintegrating into energy, and energy's sometimes coalescing into the alleged constituents of the atom, these constituents being obscure electrical phenomena named the electron and the positron. There is a partial (but equivocal) experimental foundation for some of these speculations; but naturally it would not be possible to state them in scientific form without much abstruse mathematics. It will not be necessary to follow out all these matters, though it may not be amiss to suggest that the minds of even the inventors of a clever mathematical formula may be self-hypnotized by its supposed elegance, while the ordinary mortal may not be aware of how the difference between "space geometry" and and "time geometry" may be easily glided over "by a discrete use of the symbol $\sqrt{-1}$,"[2] as Eddington expresses it.

Along this line we have another warning from a writer in *Nature:*

"We appear to be witnessing not so much the birth of a new theory [of relativity], for there are already half a dozen or more species of relativity theory—Einstein's, Eddington's, de Sitter's, Weyl's, Silberstein's, Whitehead's, Robb's, and so on—as the birth of a new branch of knowledge—*mathematical metaphysics.*"[3] (See also Appendix, Note 1.)

The old form of metaphysics was often a mere playing with words, which might have two or more meanings, or might mean almost anything which the user wished to inject into them. These words were many of them pure abstractions, but often were reified, or treated as real entities; and thus almost any scheme of life might be put forward under the mental smoke screen of a skillful use of these weasel words. But the new form of metaphysics is "mathematical," and is

[2] A. S. Eddington, "The Nature of the Physical World," p. 135. Cambridge University Press, 1928.
[3] *Nature*, April 11, 1925, p. 533.

now chiefly concerned with schemes about the structure of the atom and its behavior, and hence about the origin of the universe. And as it is all done in the name of science, and as the multitude of actual discoveries have tended to throw a halo of almost religious power and authority around anything claiming to be scientific, the new metaphysics may prove capable of leading the multitudes astray as fatally as they were ever seduced by ancient priest or false prophet.

Since all cosmological speculations run directly counter to the record of Genesis that creation is a finished work and is not now going on, *they must be pseudoscientific, and must always be dangerous.* But these speculations about the origin of the universe and of man himself as the product of a cosmic evolution, have already taken on a religious tone, and are deceiving many men. Thus modern "science" is doing this work of deception under the influence of those genuine "signs" or "wonders" which it has been performing; and we are constantly being told that the actual accomplishments of the radio, the airplane, and all the myriad wonders of applied science *are the proof* that these speculations about the evolution of the universe (cosmic and organic) are equally true and worthy of our trust.

The old proverb used to tell us that the undevout astronomer is crazy. But the modern craze of astrophysics and its "mathematical metaphysics" is making it very clear that when even learned scientists attempt to deal with problems of cosmic origin, they are like a crowd of children turned loose in an open boat on a shoreless ocean without any chart or compass. It is likely to be a long while before they reach land; if they ever reach truth of any kind by such a method, it will be due to something more than their own wit and scientific knowledge.

Nothing is more needed today than for us to shake off the unholy spell which the legitimate achievements of science are throwing over the people of our world, leading the multitudes

to accept speculations about the origin of the world and the universe that are as certain to poison the religious and spiritual life as arsenic or cyanide would poison their bodies.

The man or the woman who is determined to remain true to God and to the faith once for all delivered to the saints, must resolutely refuse to bow to this modern Baal, even though much greater wonders may yet be performed before our eyes to apparently confirm the theories which we know are utterly contrary to every fundamental teaching of the Bible.

However, amid all the confusion among physicists and astronomers now prevailing, certain definite results seem to emerge as settled facts.

It will be the object of this and the following chapters to state some of these facts, so that the reader may draw from them conclusions which will help him in his efforts to maintain his faith in God's truth amid the confusions and turmoils of these days.

II

In order to appreciate the tremendous change which has come over the physical sciences, we need to go back in history a little. The habit of looking upon the material part of the universe as really eternal both past and future, was very strongly established by the beginning of the nineteenth century. John Playfair (1748-1819), the mathematician and physicist, who, as a disciple of James Hutton and an exponent of the latter's geological speculations, had such a profound influence on Charles Lyell, was only echoing the commonly accepted notion when he taught the eternal uniformity of the geological processes, because he believed in the eternity of the entire physical universe.

Lord Kelvin's testimony on this point ought to be sufficient:

"Playfair, in what I have read to you, speaks of the planetary system as being absolutely eternal and unchangeable; having no beginning and showing no signs of progress toward an end."[4]

From this background, there is little wonder that Charles Lyell "taught the doctrine of eternity and uniformity in geology," as Kelvin puts it in this same address on "The Age of the Earth," which made as much talk in its day as the theory of relativity has made in ours. Kelvin's argument was that the earth could not be older than a limited number of millions of years; but his style of argument is now so out of date that we need not pause to reproduce it here. We can suppose that it served a useful purpose in calling attention to the falsity of the then popular idea that the world and the solar system were eternal; though the number of millions of years which even Kelvin was willing to allow for their age would almost seem like a large fraction of eternity.

The establishment of the laws of the conservation of matter and of energy, which Kelvin himself did so much to bring about, seemed to give a new lease of life to the essentially pagan theory of the eternity of matter, or of the material universe. For when I was a youngster in high school, the textbooks all implied, if they did not teach openly, that the material universe is eternal, that it never had a beginning and would never have an end.

The end of an era was reached when an eminent English physicist announced near the beginning of the present century that probably all the great fundamental discoveries in physics were already reached, and that progress in the future would be reached by an "examination of the third decimal point." They knew about all that was worth knowing about the universe; but refinements of technique would still be possible, and these refinements were the direction in which progress could be expected in the future.

[4] Annual Report of the Smithsonian Institution, 1897, p. 341.

The awakening from this colossal egotism came in a succession of startling discoveries. Radioactivity and the X rays astonished the world, but there followed so many strange new ideas that nobody but a few experts were able to keep up with them. For mathematicians the revolution of thought may be regarded as dating from the introduction of the "quantum of action" by Planck about 1900 and the first or special theory of relativity by Einstein some five years later. The concept of "quanta" is that energy is transmitted in minute pulses, or quanta. The quantum is an extremely minute mathematical unit of *energy* compounded with *time,* and this unit has since been employed in describing all forms of radiation. I have discussed some of these things in a former work,[5] and need not dwell upon them here.

After the transmutation of the elements, first naturally and then artificially, had become commonplace, a profusion of other discoveries of an electrical nature seemed greatly to increase the complexity of the atom and its behavior; and soon the study of the nucleus of the atom became the chief occupation of many physicists in all lands in which the very expensive apparatus necessary for this work was available. The mathematical laws already familiar in connection with gross mechanics, or large-scale phenomena, were extended to the infinitely minute scale of the nucleus of the atom and its many orbital surroundings, with a succession of discoveries in the laboratory which made the invention of new hypotheses an almost daily affair. The varied forms of wireless communication, television, and the photoelectric cells, with a host of other discoveries, all involve forms of electrical action on what is termed the atomic level, or the atomic scale of magnitude; and incredible theories and ingenious new forms or new applications of mathematics have been invoked to "explain" these phenomena.

[5] See "A History of Some Scientific Blunders," p. 53. New York: Fleming H. Revell, 1930.

As the outcome of these discoveries, it is now the fashion to say that matter and energy are interchangeable, matter can change into energy and energy into matter, a view which is briefly expressed as the interconversion of matter and energy. As this would involve the modern creation of matter by artificial means, this theory (for it is only a theory, an interpretation of an interpretation) must be looked upon with very grave suspicion by every sincere believer in the original creation as a finished work and the Sabbath as a memorial of this profoundly important truth.

Furthermore, this theory of the interconversion of matter and energy tends immeasurably to confirm the materialistic view of the universe, or the view that matter has within itself the powers or "properties" by which it acts. And this materialistic view of the universe is exactly what this chapter is designed to counteract and refute.

The new forms of theoretical physics attempt to deal with every known form of physical event in the heavens above and in the earth beneath; but we are concerned here chiefly with the varied phenomena of radiation, such as light, heat, and the myriad forms of electrical action, together with that bugaboo of the physicist, action at a distance, the most familiar form of the latter being gravitation. In many aspects of these problems the new mathematics has won favor because it has succeeded in reducing them to much greater unification than ever before, this unification resulting in much greater simplicity of statement. Now simplicity is to be desired; but the danger is that we may think we have solved all the mysteries of the universe by being able to state every physical process in simple mathematical form.

But much of the more newly discovered processes, such as those now being interpreted as due to the component parts of the atom, are concerned with almost infinitely small distances and quantities; and many modern scientists are seriously questioning whether it is legitimate to extrapolate the laws

of the larger aspects of nature (mechanics) to the almost infinitely small, which cannot be observed directly, but only indirectly, by means of electrical effects. However, much seeming success has attended this extension of mechanics to the phenomena of the atom and its hypothetical nuclear components; and we need not expect any abatement of these lines of experimental study or of the mathematical theories which will try to "account" for the known phenomena.

But the Christian thinker who wishes to understand the religious aspects of these matters must constantly remember that the success of a mathematical formula in describing either the large or the small aspects of the universe does not oblige us to accept the materialistic philosophy so often associated with such a formula. For no statement of *how* the parts of the universe behave can ever tell us *why* they behave thus.

The gist of my contention here is that it is a thoroughly pagan doctrine out and out that the things of nature, either the large or the small, have within themselves the powers or "properties" by which they act. Nature is not self-acting; and this applies to the infinitely small as well as to the infinitely great. Newton was a reverent Christian, and he resolutely disbelieved in this idea of a self-acting universe; nevertheless his brilliant statement of the laws of celestial mechanics was seized upon by Voltaire and others to inaugurate a reign of materialism based on the mistaken idea that Newton's laws helped to do away with the concept of God as the ever-acting manager of the universe. And in our day the new physical theories dealing with radiation and so-called atomic structure are being similarly manipulated for belligerent purposes in the interests of unbelief.

Einstein's relativity consists not only of mathematical equations, but even more of a new method of looking at the universe. Everybody who has studied the matter knows that many aspects of the relativity theory tend strongly to foster

the idea that the universe about us is not what it seems to be, and that our common-sense ideas are very likely mostly wrong—in short, that the universe may have no objective reality, such as we think, but may be largely or wholly what our minds have made it seem to be. This is illustrated by such ideas as that of "curved space," of measuring rods which shorten when set in motion, and clocks which cannot be relied upon when they are moved, etc. Thus our ordinary common sense seems to be repudiated, and the objective realities of the universe tend to become explained away and to become only such things as dreams are made of,

> "A tale
> Told by an idiot, full of sound and fury,
> Signifying nothing."

Eddington well expressed this aspect of unreality which relativity tends to throw over all nature, when at the very end of one of his earlier books he wrote:

> "We have found a strange footprint on the shores of the unknown. We have devised profound theories to account for its origin. At length we have constructed the creature that made the footprint, and lo, the footprint is our own."[6]

But I hold that the universe has an objective reality, and that all Christian life is endangered when we accept such views of the universe, no matter how cleverly and with what seeming inevitability they are presented under the aegis of mathematical science.

But then, by a strange inversion of values, complete objective reality is assigned to what are termed the components of the atom and all forms of radiation, including the photons, or the units of light. These have to be treated as actual particles or physical entities, and are reckoned as having mass, velocity, etc., in spite of the very positive declaration

[6] Quoted by Sir Oliver Lodge, "Relativity," p. 45. New York: George H. Doran Co., 1926.

of one of our foremost physicists, P. W. Bridgman, of Harvard University:

"Hence from the point of view of operations it is meaningless or trivial to ascribe physical reality to light in intermediate space, and light as a thing traveling must be recognized as a pure invention."[7]

The same author also says:

"Physically it is the essence of light that it is *not* a thing that travels."[8]

And thus we have a system of new mathematical physics by which the general or common-sense aspects of the world are explained away, while such phenomena as light and all the variant manifestations of energy in radiation are reified and treated as objective entities. True, the mere mathematical statements about these things seem to "work;" that is, they seem to help in the scientific computation of the "laws" of these phenomena; but all this does not prove that the metaphysics involved is correct.

A recent writer has stated the present situation thus:

"According to physicists, this generalized hypothesis to account for light and matter by wave mechanics explains all the recent experiments which the older physics failed to explain. But it makes a great mystery of physics; in a memoire, written in collaboration by Maurice de Broglie and Louis de Broglie, we read that the photon is a corpuscle of light whose nature remains very mysterious: Wave mechanics associates with motion 'the consideration of a wave, without physical reality, but which can be predicted.' "[9]

Here, then, we have a very candid and revealing admission. The orderly behavior of these phenomena can be computed and their results predicted mathematically, but the "waves" so often spoken of in connection with these phe-

[7] P. W. Bridgman, "The Logic of Modern Physics," p. 153. New York: Macmillan Company, 1927.
[8] Id., p. 164.
[9] Gabriel Louis-Jaray, in Annual Report of the Smithsonian Institution, 1938, p. 132.

nomena are a pure fiction; they are without physical reality.

As remarked above, the new mathematical physics has had much success in unifying the physical laws of the universe, though not all physical processes have yet been brought under one formula. But why may not all the physical processes of nature be capable of correlation and unification, if we can succeed in learning enough about them? Is there not one God in charge of them all?

But this same writer in the Smithsonian Report goes on to tell us how these new views are being used to bolster up a modern form of pantheism:

"We perceive, by these simple indications, to what extent the new physics is still mysterious and how it tends toward unity. It gives at times the impression that all material reality, in the older sense of the word, has disappeared and in its place there is substituted that which one might call a unique substance having corpuscular atomic form and possessing interchangeable attributes of mass and energy. It seems to lead thus to a kind of materialistic 'monism,' outside of which the mysteries of life and mind exist."[10]

This statement deserves particular attention. It tells us that these new views tend (in their theoretical aspects) to explain away the ordinary objective realities of the universe, and to substitute for them positrons and neutrons, photons and neutrinos, and I don't know how many other mysterious entities, all leading us to "a kind of materialistic 'monism,' " or pantheism. And the wise Christian will take warning accordingly.

Let me present another quotation from this same author, whose paper is honored with the first place in the 1938 volume of the Smithsonian Report:

"All the experiments relative to 'quanta' for thirty years are affected by an unknown, an indeterminate element that must be introduced to make the calculations succeed. This indeterminate

[10] Id., p. 132.

constant has been represented by h, and it is even to this day susceptible of no interpretation. All the determinism of the mechanics of Newton is thus as if undermined at its base. 'The significance [of this constant],' says Louis de Broglie, 'has been for thirty years and still is today the enigma of modern physics; it has remained the undefinable syllable in nature's crossword puzzle.' "[11]

There never was any determinism or sheer materialism in the mechanics of Newton, as this statement implies; for Newton was a reverent Christian, and never hesitated to assign the phenomena of nature to God's direct fiat control. It is only when God is left out, and the attempt is made to explain all phenomena as due to the inherent properties of the things themselves, that the trouble arises. And the complete impassé which physics and astronomy have now reached in these matters, ought to be an admonition to those engaged in these studies to revise their fundamental ideas about the self-sufficiency of the universe to run itself without a God.

III

I cannot find exactly who it was among eminent scientists who first had the courage to declare that matter, or the stuff of which the universe is composed, must have been created. It took some intellectual and moral courage to make such a statement a few years ago, after the long previous period during which matter had been regarded as eternal, uncreatable, and indestructible. But for more than ten years I have been quoting the unequivocal statement of James H. Jeans, as given in one of his earlier books:

"Everything points with overwhelming force to a definite event, or series of events, of creation at some time or times, not infinitely remote. The universe cannot have arisen by chance out of its present ingredients, and neither can it have been always the same as now."[12]

[11] Id., p. 133.
[12] James H. Jeans, "Eos," p. 55. New York: E. P. Dutton & Company, 1929.

At that time Jeans was a comparatively unknown man, though he was known among men of science, and was the secretary of the Royal Society. Since then, however, he has been honored by the king of England with knighthood and the Order of Merit, and his books have become best sellers throughout the English-speaking world.

Of course, he is not alone in thus declaring for an original creation of the material universe. Many other eminent physicists and astronomers might now be quoted on the same side, such as Arthur H. Compton of the University of Chicago, and Robert Andrews Millikan of the California Institute of Technology, at Pasadena, California. Here is a statement from another English man of science who is equally well known:

"We cannot understand the existence either of ourselves or of an external world unless we postulate some kind of creation. Creation involves design and purpose and mental activity, and necessarily implies a Creator of some kind." "I claim that the material universe with its variously designed atoms, and the way they have been used in the construction of all objects, mineral, vegetable, and animal, that we see around us, is a sign also of design and purpose, and is a glorious work of art."[13]

Let it be explained that Christians do not believe in an original creation *because* of the testimony of such men. They would so believe even if all similar men of science were against them; and, as a matter of fact, many of us did thus believe fifty years ago when almost the entire scientific world was teaching the eternity of matter and of the universe. But it is worth noting, as I am doing here, that the doctrine of the first chapter of the Bible, "In the beginning God created the heaven and the earth," is today in vastly better company than it was even so recently as forty or fifty years ago. And this is something.

[13] Sir Oliver Lodge, in "The Great Design" (edited by Frances Mason), p. 231. London: Duckworth, 1934.

IV

Now I am not concerned with someone's objection that even the most conservative astronomical estimate of the age of the universe is extravagant, from the point of view of the Genesis record. How so? I have always been contending for a system of geology which can be fitted within the time limits of the Bible; but what is there in Genesis which tells us anything whatever about how old the universe is—I mean the rest of the universe outside our solar system? Absolutely nothing at all.

Was there not plenty of the universe already on hand, probably already in existence for long ages, when, at the "foundations of the earth," or the beginning of our world and its physical setting in the solar system, "the morning stars sang together, and all the sons of God shouted for joy"? Job 38:7.

It is not correct to say that the age of the whole sidereal universe must be "cabin'd, cribb'd, confined" within the compass of the creation week of the first chapter of Genesis. Such a view is wholly contrary to the many scriptures which speak of vast numbers of created beings, and of course vast numbers of created worlds, already in existence when creation week began.

This solar system, with its central powerhouse, the sun, and its attendant planets and satellites, is so isolated in space from the rest of the universe that, if we should draw it to a scale, with one millimeter representing 10,000 miles, our sun would be about the size of a baseball, while our earth would be represented by a small dot 8/10 millimeter in diameter, about 9.3 meters away, or about the distance across a good-sized schoolroom. Venus and Mercury would be represented by still smaller dots somewhere within the scale of the schoolroom, but Jupiter would have to be represented by something about as big as the end of one's finger about 160 feet away,

and Neptune would have to be placed nearly a fifth of a mile distant.

But on this same scale, *Alpha Centauri,* the nearest of the fixed stars or other suns, would have to be represented by something about the size of a football, and about *1,600 miles away,* or about the distance from San Francisco to Omaha, or from Denver to Washington. Does anyone who thinks clearly suppose that a body the size of a football, situated at Denver, would be affected in any way by the gravitational pull of another body the size of a baseball, with a few pinheads around it, if these were suddenly created or annihilated at Washington, D. C.? Pedants might be able to work out some arithmetic to fit the case; but it is not a question that concerns us in any practical way.

Also, since we have not the slightest hint in divine revelation regarding how long the sidereal universe was in existence before the creation of our earth and solar system, I am not at all interested in how many ciphers the astronomers want to place after their digits to represent their guess about the age of the universe.

But I am vastly concerned with the fact, now shouting to us from all the housetops of the scientific world, that the universe has *not* existed eternally, that it had a beginning, and that this beginning must have been by the fiat decree of the great Jehovah.

V

The average, well-informed man has a profound, almost idolatrous, respect for any conclusions claimed to have been reached by mathematics. He is forgetful, perhaps has never fully realized, that mathematics is only a form of logic. Now he has acquired a distrust of formal logic; for he has learned that a so-called logical conclusion may be absolutely and entirely wrong; and if he were trained in logical methods, he would realize that these wrong conclusions are usually

reached, not by any slip along the road, but by the line of road on which one sets out at the beginning, that is, by the premises expressed (but usually only implied) to start with. But Mr. Average Man, while having acquired a distrust of formal logic, chiefly through the accumulated experiences of others, has not had sufficient time to acquire a distrust of the many new forms of mathematics which have been invented within recent years; and their fantastic and often mutually contradictory conclusions have thrown him into perplexity. Even many a Christian hardly knows what to do about the campaigns against his faith which come to him in these days. under the aegis of mathematical science.

But he ought to become acquainted with the fact that many voices are today being lifted against the atheistic or pantheistic theories about the beginnings of things, or the present conduct of the universe, which come to us in the name of mathematical demonstration. And these voices are not those of ignorance; rather, are they the voices of sound education and enlightened common sense; for there are still some fraction of the proverbial seven thousand who refuse to worship at the shrine of the modern Baal, even at the awesome command of the square root of minus one.

Professor Frederick Soddy is one of them. A reviewer of his book, "The Interpretation of the Atom," quotes him as saying that he has—

"more and more come to regard the purely formal and mathematical presentation of physical theories as a disguise and evasion of the real problems, rather than as any solution of them."[14]

Now the real problems which are thus disguised or evaded may be arranged into two groups: those that have to do with *action at a distance,* such as gravitation and the other attractive "forces," and those that have to do with the various forms of *radiation,* which are all fundamentally of the same nature,

[14] London *Times* Literary Supplement, Oct. 20, 1932, p. 746.

and can be arranged in a sort of gamut in the order of their decreasing "wave length," from wireless "waves," through heat, light, ultraviolet rays, X rays, and gamma rays, to the cosmic rays.

These two great classes of phenomena, "forces" which act at a distance across vacant space, and radiations which appear to "travel" by so-called "waves" across equally vacant space without any medium (such as the mythical *ether*) to do the waving, are obviously due to the direct fiat action of the God of the universe. But for those whose minds are afflicted with theophobia and refuse to have the King of eternity to reign over them, or who simply resolve to formulate a purely agnostic science with God entirely left out, these problems have to be disguised or evaded, as Soddy says they have been, by the pompous, pseudoscientific methods of esoteric mathematics.

Dr. Herbert Dingle, of the University of London, pays his compliments to what he calls the new "cosmolatry," or the worship of cosmological schemes of our own making, this cosmolatry, he says, having been born by unnatural generation with metaphysics for a father and mathematics for a mother.

He pictures the general public as being dazed at the recent development in mathematical physics, which seems to make the study of the universe, its origin and its atomic structure, its sole occupation; while the scientific world is itself almost equally dazed by "the wholesale publication of spineless rhetoric the irrationality of which is obscured by a smoke screen of mathematical symbols."[15]*

This modern "universe mania," as he also calls it, seems to have started from Einstein's theory of relativity, which at

[15] *Nature*, May 8, 1937, p. 784.

* One writer quoted recently, says: "There is no such thing as mathematical *truth*; there are only right and wrong equations."—*Nature, Oct. 3, 1931, p. 562.*

first was modestly enough designed only to "explain" light and the other forms of radiation without any luminiferous ether, which by the Michelson-Morley experiment had become obviously useless or absurd. In its *first,* or *limited,* form it was innocent enough in appearance, almost a truism; but almost immediately it became a cosmical speculation applying to the entire universe, and as such it was used for aggressive purposes in the interests of atheism or agnostic pantheism. Not all saw or realized these implications; for the new theories were being widely acclaimed on every side, and seemed to have solid scientific backing. Says Professor Dingle:

> "Consequently the bewildered physical world came to imagine a necessary association between relativity and cosmology; and, believing where it could not prove, extended to the cosmological speculations the scientific sanction which had been earned only by the underlying system of mechanics."[16]

The modern craze for inventing new schemes for "explaining" the electrical structure of matter and, essentially, all the processes of the universe, has given us already a confusing array of such inventions, all dressed up in mathematical garb, and claiming the confidence of the public in the name of those most solidly established of the sciences, astronomy and physics. And on every hand, from the chairs of thousands of professorships and the presses of hundreds of journals, this "pseudo science of invertebrate cosmythology," Professor Dingle says, invites us to commit logical suicide "to avoid the need of dying."

Such are the rather vigorous words of one who cannot be accused of not knowing what he is talking about. He concludes this paper by saying that physics must choose between two sorts of foundation principles, observation and speculative invention:

[16] *Nature,* May 8, 1937, p. 784.

"But the question presented to us now is whether the *foundation* of science shall be observation or invention. Newton* did not lack imagination, but he chose to examine pebbles rather than follow the Gadarene swine, even when the ocean before him was truth."[17]

In a subsequent paper Doctor Dingle returns to the attack, and directs his specific attention to the colossal egotism of Einstein's theory, which poses as a description of the universe, and yet it resolutely rules out everything which is not subject to observation and measurement in a physical way. I shall not inflict the details of the argument which Dingle urges against it, for it would take the reader into the deep waters of metaphysics and the idealistic philosophy, where an I-know-it-all attitude masquerades in the garb of humility by ruling out of consideration everything in the heaven above or the earth beneath except what we can compass by our scientific and mathematical acumen.

"Our description of the universe must describe nothing else, must imply the existence of nothing else, must imply the possible existence of nothing else. If we do not accept this principle, we must reject relativity and a considerable part of the quantum theory as worthless illusion."[18]

And this author, who is the head of the department of physics of the University of London, concludes his remarks by saying:

"And the point I wish to emphasize as clearly and unmistakably as possible is that anyone who regards the recent trend in physics in general, and the theory of relativity in particular, as legitimate science or philosophy or intellectual activity bearing

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* Here is the statement of Sir Isaac Newton, already a classic, to which allusion is made in this quotation from Professor Dingle: "I do not know what I may appear to the world; but to myself I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me."—*Sir David Brewster, "Memoirs of Newton," Vol. II, p. 407. Edinburgh: T. Constable & Company, 1855.*

[17] *Nature*, May 8, 1937, p. 784.

[18] Herbert Dingle, "Science and the Unobservable," in the Annual Report of the Smithsonian Institute, 1938, p. 220.

whatever name may be thought honorable, must be either an idealist [perhaps a Berkeleyian idealist] or presume that he is omniscient."[19]

On a previous page Dingle explains what he means by being "omniscient." He does not mean having knowledge of everything that exists or that can be observed, but having "complete knowledge of the existence and properties of every means by which observation is possible."[20] And this, as I understand it, is exactly what the glory of relativity assumes. One who reads Einstein's original book, "The Theory of Relativity," is certainly inclined to get such an impression regarding the assumptions implied by his methods. The other horn of Dingle's dilemma, that a relativist may be an idealist, fits Jeans and some others like a photograph; for every reader of Jeans' books cannot fail to recognize the so-called "idealism" of George Berkeley on many a page. Hence Professor Dingle was not speaking at random when he framed the dilemma of "idealism," or omniscience, for all the followers of these new theories in physics.

And if I understand him aright, Dr. P. W. Bridgman of Harvard has in mind this arrogant claim that the theory of relativity is a competent measure of everything worth knowing, when in the final chapter of his recent book, "The Nature of Physical Theory," he says: "Man has never been a particularly modest or self-depreciatory animal."[21]

Bridgman is keenly critical of many of the theories in physics which are now having such a vogue. He wants his fellow scientists to keep their scientific feet firmly on the ground, and not go off sailing on airy shadows of their minds' own throwing. He believes in "operations," or what are more commonly but less exactly termed "experiments;" and

[19] Id., p. 226.
[20] Id., p. 216.
[21] P. W. Bridgman, "The Nature of Physical Theory," p. 135. Princeton University Press, 1936.

he is resolutely suspicious of every scientific statement that cannot thus be checked up against objective reality.

After making the remark given above about man's never having been a particularly modest animal, Bridgman goes on to illustrate the fact from several ideas now current among scientists. He mentions such taken-for-granted notions as the belief in man's ability to solve all the problems of existence by "utter logical rigor;" the belief in the absolute validity of the conclusions of modern physical science; and the belief that mathematics has pontifical infallibility and is superior to experience. These ideas, he says, "are not the ideas of a modest animal." And I fully agree.

In a former work, Bridgman, who certainly will not be accused of ignorance of mathematics, tells us how the science of numbers may be abused.

> "It [mathematics] begins by being a most useful servant when dealing with phenomena of the ordinary scale of magnitude, but ends by dragging us by the scruff of the neck willy-nilly into the inside of the electron, where it forces us to repeat meaningless gibberish."[22]

As the context shows, what Bridgman means is that our mathematical tools are made to deal with gross objects, and are not adapted to deal with subatomic phenomena. You can't repair a watch with a crowbar or a sledge hammer. He wishes we could have mathematics which would be suitable for these small-scale phenomena of the "components" of the atom; but we do not. And our crowbars and sledge hammers bungle the job, though this is no reflection on their legitimate use in the purposes for which they were originally made.

That there is no such stuff as the luminiferous ether, that light and other forms of radiation are not entities which

[22] P. W. Bridgman, "The Logic of Modern Physics," p. 149. New York: The Macmillan Company, 1927.

travel from one point to another, that the electric and magnetic "field" is a pure fiction, are some of the basic facts which are most assuredly proved by modern physical science. Page after page could be given here from such authors as Bridgman and Louis T. More and others in support of these ideas and against those who would reify these abstractions, and at the same time try to trick our reason into believing that matter and the material universe are not real and have no objective reality apart from our minds.

As for action at a distance, which is so obvious in the case of gravitation, unless we have become befuddled by the "curved space" and other weird inventions, Bridgman has this to say:

"To many minds the concept of action at a distance is absolutely abhorrent, not to be tolerated for an instant. . . . But I can see no justification whatever for the attitude which refuses on purely *a priori* grounds to accept action at a distance as a possible axiom or ultimate of explanation. It is difficult to conceive anything more scientifically bigoted than to postulate that all possible experience conforms to the same type as that with which we are already familiar, and therefore to demand that explanation use only elements familiar to everyday experience."[23]

We have also the following from another eminent physicist, the dean of the graduate school of the University of Cincinnati:

"I accept frankly the idea of action at a distance, not because it seems reasonable, for my experience teaches me that to cause motion I must construct a link between two bodies; but the fact remains, that both gravitational and electrical attractions seem to act at a distance and all attempts made to explain them have so confused the mind that the occult phenomenon is less perplexing than the occult explanation."[24]

But if by careful analysis flaws may be detected in some

[23] Id., pp. 46, 47.
[24] Louis T. More, "The Limitations of Science," p. 122. New York: Henry Holt & Company, 1915.

of the most basic ideas of physics, which has long been regarded as the most rigidly exact of all the natural sciences, what are we to say about those fantastic speculations of such sciences as geology and paleontology, which with no pretense at modesty volunteer to tell us exactly what "primitive" man was like a brief half-million years ago, or what the world itself was like a hundred times still farther back in the abysm of time? If the most firmly accepted ideas of physics do not show conspicuous evidences of man's being a modest animal, what are we to say of those theories about our ability to solve all the problems about man's origin and destiny entirely apart from a divine revelation, or even in flat contradiction of the revelation which God has graciously given to us?

VI

Light may be considered as like all other forms of radiation, so that what we determine for light will hold good for all the various forms of radiation.

Here is what a very thoughtful writer says on the subject:

"If we say that light is a mode of vibration of the ether, all we assert is that light has a periodic character, or is a periodic character of certain events, and we invent a hypothetical substance for it to vibrate in. But this merely represents a confession of our inability to think of vibrations unless they are vibrations of a stuff. The truth would appear to be that light is an entity of a kind for which common sense has no name and no concept, and we therefore try to assimilate it to other types of existents."[25]

And here is a statement from that master thinker, Sir Isaac Newton:

"But they, that like not this, may suppose light [to be] any other corporal emanation, or any impulse or motion of any other medium or aethereal spirit diffused through the main body of aether,

[25] J. H. Woodger, "Biological Principles," p. 188. New York: Harcourt, Brace & Company, 1929.

or what else they can imagine proper for this purpose. To avoid dispute, and make this hypothesis general, let every man here take his fancy; only whatever light be, I suppose it consists of rays differing from one another in contingent circumstance, as bigness, form, or vigour."[26]

All of which amounts to saying that Newton didn't know any "explanation" for the *cause* of light, except that it is a direct manifestation of the fiat control of God over His universe. We can measure it in a thousand ways; we can utilize it for myriads of purposes; but modern science does not know anything more about its "cause" than Newton did. Perhaps we should rather say that modern scientific discovery and experiment are proving conclusively that it does *not* have any mechanical or material *cause;* it must be a direct manifestation of the fiat of the ever-acting Creator.

Says A. N. Whitehead:

"It has been the basis of the materialistic theory, that the happenings of nature are to be explained in terms of the locomotion of material."[27]

He shows that this view has had to be abandoned with regard to light; but it is still held to tenaciously with regard to the structure of the atom. After pointing out in picturesque language the difficulties of the quantum theory in this connection, he proceeds to say:

"The result is that the physical doctrine of the atom has got into a state which is strongly suggestive of the epicycles of astronomy before Copernicus."[28] (See also Appendix, Note 2.)

And he adds:

"At any epoch the assumptions of a science are giving way when they exhibit symptoms of the epicyclic state from which

[26] Sir Isaac Newton, "Principia," quoted in R. H. Murray's "Science and Scientists in the Nineteenth Century," pp. 393, 394. London: The Sheldon Press, 1925.
[27] A. N. Whitehead, "Science and the Modern World," pp. 189, 190. New York: The Macmillan Company, 1925.
[28] Id., p. 190.

astronomy was rescued in the sixteenth century. Physical science is now exhibiting such symptoms."[29]

It is evident that physical science ought to have a house cleaning of old, out-of-date notions. And the most outmoded of them all is the ingrained conviction, as persistent as original sin, to use Bridgman's phrase, that the "properties" of matter belong to the pieces of matter themselves, instead of the Christian view that the latter are merely counters or puppets under the ceaseless care and management of the Creator Himself.

In this connection it would be well for us to remember the advice of A. N. Whitehead:

"When you are criticizing the philosophy of an epoch, do not chiefly direct your attention to those intellectual positions which its exponents feel it necessary explicitly to defend. There will be some fundamental assumptions which adherents of all the variant systems within the epoch unconsciously presuppose. Such assumptions appear so obvious that people do not know what they are assuming, because no other way of putting things has ever occurred to them."[30]

This theory of inherent "properties" in pieces of matter, including those pieces which we term "living," is one of these fundamental assumptions which everybody takes for granted without any examination. But it is false and anti-Christian, and now in a multitude of ways it is proving to be clearly absurd and unscientific.

VII

In view of all these things which help us to realize the large element of subjectivity in the modern theoretical phases of physics and astronomy, one hardly knows how much trust ought to be placed in some of the now popular ideas. For

[29] Id., p. 196.
[30] Id., p. 71.

instance, what about the idea of an expanding universe, which seems to be widely accepted? It is based on the observed shift to the red end of the spectral lines of the remote extragalactic nebulae, this shift "being approximately, although not exactly, proportional to the distance of the nebula."[31] This is interpreted as a Doppler effect, and thus would prove that the nebulae must all be scattering out or running away from us as from a center, thus doubling the total size of the universe in a certain number of millions of years.

By following this idea backward in time, we would inevitably reach a point when the universe must have started. Eddington dwells on this idea in a lecture before the Royal Institution in London. He says: "It seems likely that the universe started [*sic*] with a balance between gravitational attraction and cosmical repulsion,"[32] the cosmical repulsion being now seen in this expansion of the universe. Since Eddington's business is that of astronomy, we listen with respect when he goes on to comment on the rate of expansion which seems to be indicated:

> "Astronomers, who had been picturing a slow evolution of the stars extending over billions of years, would scarcely believe our staid old universe capable of such a hustle. In fact, it means a cut of something like ninety-nine per cent in our time scale, which even in these days of economy cuts is not to be accepted lightly by the department concerned. . . . I think, however, that we shall have to accept the expansion."[33]

Parallel to this idea of an expanding universe and pointing in the same direction backward to a definite starting point, is the theory that the radiation from the stars (or suns) must be due to the annihilation of some of the matter composing them. Obviously, such an annihilation or disintegra-

[31] James H. Jeans, *Nature* Supplement, July 18, 1931, p. 104.
[32] *Nature*, March 19, 1932, p. 421.
[33] Ibid.

tion of matter cannot have been going on eternally; the universe must have had a definite beginning. If the universe were as old as some theorists used to think, there wouldn't be any matter left to be disintegrating now. And commenting on this idea, Jeans tells us:

"If we cannot have this [complete annihilation of the matter of the universe], we must conclude that the universe of stars is still quite young, in spite of looking so old; its many appearances of great age must all be deceptive."[34]

He goes on to connect this idea of the finite age of the universe based on the annihilation of matter with the similar conclusion based on the expansion of the universe. He says:

"Recent astronomical observations, if they have been rightly interpreted, indicate that it [the universe] actually is expanding, and this at so rapid a rate that it becomes a mere transitory and ephemeral structure compared with what we recently thought: the spectra of the great extragalactic nebulae seem to indicate that these bodies are running away from one another so fast that they cannot have been running for long. This reduces the whole life of the universe to a matter of hundreds of thousands of millions of years *at most*—and incidentally, in so doing, brings almost complete chaos into the already chaotic problem of stellar evolution."[35]

There is still a third great law or universal principle which also points to the finiteness of the universe, or that it had a beginning in time and now is not progressing but is degenerating, so far as its available energy is concerned. I refer to the great second law of thermodynamics, often called the "law of *entropy*," which is that there is a continual leveling out of the energy of the universe, passing from forms of higher availability to forms of lower availability. This law of entropy, or the tendency toward a uniform distribution of energy, unlike many of the other laws of physics and astronomy, is an old and long-established principle, which, as

[34] *Nature* Supplement, Oct. 24, 1931, p. 703.
[35] Ibid, italics supplied.

Eddington says, holds "the supreme position among the laws of nature."[30] Most of the other laws of physics have, under the revolutionary impact of the new ideas, been reduced to merely statistical averages; but this law of entropy seems to be more firmly established than ever before. And more than one modern writer has pointed out that such an irreversible process, tending in only one direction—namely, to what is sometimes termed "heat death"—points backward to a definite beginning by a Power independent of the universe itself.

Now Christians will freely admit that these ideas—the annihilation of matter, the red shift of the spectral light of the nebulae, and entropy, or the second law of thermodynamics—are only theories, and may be subject to revision with further discoveries. This is true of all scientific interpretations of nature. But it is a matter of contemporary knowledge that these ideas have contributed to the establishment of a belief in a primal creation of the universe, whereas, as remarked above, a half century ago and for a long time previously, the past eternity of the material universe was taught as established doctrine. And I say, So far so good. We Christians don't believe in creation because of these scientific views; but our belief in a primal creation is in vastly better company now than when I was a young man.

Nor am I concerned with the objections of some that these scientific theories about the trend downward of the universe are deistic by implication, in that they seem to indicate that God is not now caring for the universe which He has made. These very people who raise this objection probably believe that human life on this earth trends downward, and that all plant and animal life is degenerating, not evolving; yet they would not admit that such a view is deistic. For we all know that God has made provision for counteract-

[30] A. S. Eddington, "The Nature of the Physical World," p. 74. Cambridge University Press, 1928.

ing all this, although we may not have the slightest scientific evidence that any such counteraction is now going on. Then why do we need to expect physical evidence in the stars or in the behavior of inanimate matter which we can point to as counteracting those visible tendencies which we seem to see in the material universe around us?

VIII

Fifty or more years ago, Lord Kelvin used to say with much emphasis that the "luminiferous ether" is the only entity we can be sure of in physical science—we can be far more sure of it than of the reality of gross matter. Since Einstein and his fellow atheists or atheistic pantheists have agreed to "abolish" the ether, or at least to snow it under with a mass of esoteric mathematics, they seem to have transferred the formerly divine powers of the "ether" to what they now call "space," so that "space" is now the wonder of wonders, the modern god that performs all the miracles of nature.

Ordinary mortals who have not tried to keep up with modern speculations can have no idea of the complete bewilderment which has taken possession of physicists and astronomers within recent years. For a long time Sir Oliver Lodge stood out for the reality of the ether; but when a shift of the name was made, so as to call their deity space, then Lodge readily agreed. In a letter to the editor of *Nature* he claims that Einstein agrees with him:

"I note that he [Einstein] virtually agrees with me in claiming matter as passive and space as active. Matter is that which is acted upon; space is that which acts. Matter is inert; space is energetic. Matter *does* nothing, though it serves to display the energy of which space is full: it merely sails placidly along the path of least resistance, like a straw in a stream or a leaf in the wind. . . .

"We know that the mass of an electron is accounted for by the energy of its electrostatic field. So matter, strictly speaking, has

no active properties at all. When we say that matter is a form of energy, we mean that its existence is the sign or symbol of certain kinds of energy in space, and affords a possible means of getting at it. (It would be pedantic and inconvenient to be perpetually remembering this; so we may still attribute momentum and kinetic energy and heat energy to matter.)

"This applies to all matter. There is no discrimination between the so-called animated variety and any other. Hence the task of the biologist or the behaviorist to explain vital activity in terms of matter must be futile. Every part of every body must be controlled, guided, activated, by something in space. When an organism interferes with, or in, the course of Nature, it does so because it is actuated by something outside itself; something familiar in its effects, and usually called Life, but not yet discovered or formulated in proper terms. . . .

"Space with physical properties is usually called ether."[37]

Some of my readers will be wholly incredulous that a highly educated man, a world-famous physicist, and a president of an English university, could possibly write what seems to them like such utter nonsense. But these same people have many little gods of their own, calling them "gravity," "light," "electricity," "magnetism," and the one that Lodge mentions, "life." As I have been pointing out in various books for nearly forty years, the great law of the conservation of energy shows that all these "forces" of nature *are one and the same;* for any form of "energy" can be transmuted into any other form, back and forth, without loss; so it is a thousand times more rational and more consistent to attribute all the phenomena of nature to one supreme power, than to have a series of smaller powers, each more or less independent of one another, like the gods of the Greek or Roman pantheons. Lodge* and Einstein and many others,

[37] *Nature,* July 5, 1930, p. 9.

* Sir Oliver would, of course, have indignantly denied that he was not a good Christian. I once heard him deliver the Sunday morning "sermon" in a Presbyterian kirk in Glasgow, Scotland, at the meeting of the British Association in 1928. But as he repudiated with much scorn the doctrine of the substitutionary atonement, his god is not the One whom I worship.

being at heart consistent pantheists, are willing to call this supreme Power by the name of "space," though doubtless they would much prefer to call it Nature, and would want to write it with a capital initial.

I wish that the reader would go back again over these statements by Lodge, and note how the attributes and powers which he assigns to his "space" are exactly those which the Christian attributes to God, the Jehovah of the Bible. Throughout the entire Bible, from Genesis to Revelation, all the phenomena of nature, without any single exception, are assigned to the direct working of Jehovah. Also the theological writings of Mrs. E. G. White, which I and the readers of this book profoundly revere, attribute the entire phenomena of nature to the fiat control of God. Not only so, but all the best theologians, such as Augustus Hopkins Strong and scores of others, also teach the very same things.

And the modern educated man has only the two alternatives: either the pantheism which puts nature in place of God, and can write such nonsense as the foregoing by Lodge, about "space" being the source of all the multiplied forms of energy, or that the living God, the Creator, is still actively employed in His fiat control of the universe, "upholding all things by the word of His power." Heb. 1:3. There is no third choice possible for anyone who is acquainted with the discoveries of modern science, and who is rigidly consistent in his thinking.

I need not pursue this line of study further. The careful accuracy of the Michelson-Morley series of experiments, like those of Pasteur of a half century earlier, settled the myth of the luminiferous ether for all those who were not completely set in a will to believe in a material medium pervading all space. Like Pasteur's results, these of Michelson were hotly disputed; and one or two die-hards are still from time to time trying to discredit them. But I don't know of any first-class physicist or astronomer who has anything but admiration for the care and accuracy with which these

observations by Michelson were carried out. (See Appendix, Note 3.)

But in disproving the objectivity of the luminiferous ether, these results only shifted the argument. Einstein invented his mathematical statement of relativity, and now he and Lodge and some others want to transfer all the incredible powers of the ether to another abstraction which they term "space," but which is only a pantheistic substitute for the immanent or omnipresent power of the great Jehovah. I for one refuse to bow down and worship "space," just as forty years ago, in my very first book, I refused to worship at the shrine of the "ether," though at that time even Michelson believed in it, and instituted his experiments just to confirm it and to place the idea on a secure scientific basis.

Two hundred years ago scientists thought of matter as composed of little hard balls, eternal and incapable of further division (the "atoms"). It was taught that this matter, either in its minute structure or in its aggregate masses, contained within itself all the marvelous "properties" and "forces" which produce the phenomena of physics and astronomy. The phenomena of life could not be brought within this formula; but the world in general settled down to a stage of sheer *materialism.*

The discoveries of Oersted that magnetism and electricity are related phenomena, and the subsequent work of Faraday and Clerk Maxwell in showing that electricity can apparently be extracted from the space surrounding bodies of matter, led to the invention of the fiction of a "field of force," resulting in a transfer of the "forces" and "properties" of matter to an imaginary "ether" supposed to pervade all space, even the interiors of solid bodies. Under this view the "ether" was regarded as the source of all phenomena.

The modern theory of relativity has now transferred all the marvelous forces and properties of the universe to "space," though by another device "time" is now joined to

"space," making the highly abstract entity called *"space-time,"* which has been found capable of clever mathematical expression, and is now being used to "explain" all the phenomena of the universe. By the trick of incorporating the Kantian philosophy of the two worlds, the mental or private world of the human mind and the physical or public world of nature, this modern theory of relativity has now extended its "explanations" to include all the phenomena of life and of human conduct. In the latest statement of the theory which has come to hand, invisible spirits, or "genii," are postulated as *guiding or managing all phenomena;* the human soul is declared to be intrinsically immortal; and all these multitudinous spirits are dealt with as only sparks or emanations of the "Soul" of the universe, the great All-being spoken of as "Cosmos" or "God," the two words being regarded as equivalents or synonyms.[38]

Thus we see how the general theory of relativity has already ripened into a thoroughly pantheistic and spiritualistic philosophy of the universe. For the book just referred to, by a very eminent astronomer of the Mt. Wilson Observatory, is endorsed by Albert Einstein and many other eminent men.

Of course, in one sense one might welcome it as an open acknowledgment that the phenomena of nature cannot be rationally "explained" without invoking the supernatural. But instead of postulating a personal Creator, who is still absolutely and completely managing all the phenomena of nature by His word or His fiat control, the modern view of these eminent men is both pantheistic and spiritistic through and through, and thus opens the way to give all the weighty influence of modern science to these ancient but very dangerous deceptions.

[38] See Gustaf Strömberg, "The Soul of the Universe," p. 209. Philadelphia: David McKay Company, 1940.

IX

It is often stated these days that the universe is made up of matter and energy; but in making such a statement there is strong tendency to treat "energy" as a stuff, or an entity comparable to "matter," which certainly does have an objective existence. Also it is frequently stated or implied that matter and energy are interchangeable, the one being convertible into the other. Biologists as well as physicists and chemists are prone to treat "energy" as an entity, or a kind of "stuff," which pervades all nature.

But it is absurd to keep on speaking of energy as a kind of stuff or an activating constituent of the universe. Even Bertrand Russell, atheist as he is, has the candor to say:

"Energy is a certain function of a physical system [when expressed mathematically], but is not a thing or a substance persisting throughout the changes of the system."[39]

And Professor A. N. Whitehead says the same thing:

"It must be remembered that the physicists' energy is obviously an abstraction."[40]

The simple fact is that "energy" is just a name for the *quantitative aspect* of what we observe taking place in nature. This quantitative aspect of the events in nature can be shown to follow a regular law of "transference" which is capable of statement in mathematical equations. But instead of the pagan custom of assigning this "energy" to intrinsic properties of the things themselves, the Christian says that all the "energy" of nature is due to God's direct acting and His controlling the processes of His universe. It is regular and capable of exact calculation, simply because God is methodical and reliable; He eternally keeps faith with His creatures,

[39] Quoted by J. H. Woodger in "Biological Principles," p. 217. New York: Harcourt, Brace & Company, 1929.
[40] A. N. Whitehead, "Science and the Modern World," p. 55. New York: The Macmillan Company, 1925.

and man has been made with a mind capable of understanding and calculating the ways of God. But "energy" is not an attribute of nature, it is not a stuff, and it is not an omnipresent property of the universe. It is simply our finite, "scientific" way of speaking of the fiat control which God maintains over the universe which He has created.

X

From all the discussion of the preceding pages, we may conclude that there is now good scientific evidence to confirm the scripture that the universe must have been created by an act of an intelligent Being. A second conclusion is that this same Creator is now still actively controlling and managing the universe in its small as well as in its larger aspects. He is still upholding or managing all things "by the word of His power." Heb. 1:3. Such are the latest and most firmly established conclusions of modern physical science.

All this, of course, rules out both pantheism and deism. But the ruling out of these two errors is so important that it may well be left for a separate chapter.

CHAPTER THREE

No Modern Deism—No Pantheism

I

IF someone were to ask why a clock marks off the hours and minutes, it would hardly be considered a satisfactory answer for you to say that it does this because of the principle of horology. For this word "horology" means the science of measuring time. Hence such an answer would be mere nonsense. It would be equivalent to saying that a clock marks off time because of the science or principle of marking off time.

Of course, there would be a "scientific" method of answering such a question. It would consist in showing the mechanical and mathematical details of all the parts and their relationship to one another and to the result accomplished. The mathematical relationships of all the parts would be of prime importance.

But even such an "explanation" would be only a partial, or *ad hoc,* explanation, a proximate explanation, as the philosophers term it; for the real cause behind the clock and its ability to mark off the hours and minutes would be the clockmaker.

But most "explanations" of nature which we find in school and college textbooks are about as meaningless as this explanation that the clock runs because of the principle of horology. Some may go so far as to give the *ad hoc,* or

mechanical, explanation. But almost never do we see them tracing the process of cause and effect back to the great First Cause, the original Clockmaker of the universe, and His plan in making all things. And all too often even in schools and colleges that claim to be Christian and to be engaged in giving a Christian education, this ultimate explanation is seldom mentioned, or is omitted entirely in the study of natural science.

But why should we thus stop short of the ultimate cause of all natural phenomena, if we once and for all renounce the clumsy heresy of deism, which tried to make God a great absentee landlord, who may have started the world, but who now lets it run itself? In the intense preoccupation with *things,* almost smothered by the plethora of data, conditions which are characteristic of modern scientific research, so many are inclined to stop short of the ultimate Reality behind all nature, somewhat as astronomers still speak of sunrise and sunset, though even men who are not astronomers know that the sun neither rises nor sets.

Such *ad hoc* language may be permissible as temporary expedients; but why do so few teachers, even in Christian schools, ascend from the mere phenomena of nature to nature's God?

Of course, there have always been those whose will to disbelieve has grown into an active theophobia, and who resolutely balk whenever they are brought face to face with facts and phenomena which, in the light of present discoveries, cannot be "explained" in any mechanical or materialistic way.

Gravitation, radiation, and the various phenomena of living cells are of this character, as we shall see presently. But it must be because of the benumbing influence of the ambient Egyptian darkness, that so many people who call themselves Christians seem to talk and act like mechanists and materialists.

II

Long ago Francis Bacon (1561-1626), who may almost be credited with having initiated modern scientific research, complained of the tendencies toward narrow views in the study of the various sciences, especially the separating them as slips or cuttings from the "root and stock of universal knowledge," this latter phrase meaning, of course, the knowledge of how God conducts the affairs of His universe. In his quaint old English he goes on to speak of their being content with mere *ad hoc* explanations, instead of ascending to the First Cause:

> "I sometimes see the profoundest sort of wits, in handling some particular argument, will now and then draw a bucket of water out of this well for their present use; but the springhead thereof seemeth to me not to have been visited."[1]

René Descartes (1596-1650), who, it is said, started the machine theory of the universe, never went so far as many moderns; for he always regarded God as the Master Mechanic, who created all the "machines" once for all.

Sir Isaac Newton (1642-1727), who, as Jeans recently said, "was certainly the greatest man of science, and perhaps the greatest intellect, that the human race has seen," was always crystal clear in maintaining the limits of the scientific method and the limits of its results. Analysis or inductive study, he said, may proceed from phenomena to principles, "from effects to their causes, and from particular causes to more general ones, *till the argument end in the most general.*" And he was careful to point out that every specific line of investigation in nature, if carried far enough, must inevitably end in the "most general" cause; namely, the Creator and Manager of the universe; for he says, "It pertains to natural philosophy to reason from phenomena to God."[2]

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[1] Francis Bacon, "Interpretation of Nature," bk. 1.
[2] Sir Isaac Newton, "Principia," bk. 3.

But so blighting is the spirit of modern pagan materialism, and so universal is its influence, that few modern textbooks of physics, chemistry, or biology deign to mention the great First Cause of nature, or even to hint that this First Cause is still in full charge of all the phenomena of nature—not in any pantheistic way, but by the ever-present power of His word. Modern textbook science not only avoids very carefully any mention of God as the Creator, but the material *things* in physics and chemistry, in zoology and botany, are usually experimented with and discussed *as if they have within themselves the powers or properties with which they act.* Is it any wonder that the world has become pagan in its fundamental thinking, and that this change has come about almost within the lifetime of men now living?

What a crime against the youth that they can be conducted from the elementary school, through the high school, and on through the college or the university, and perhaps never know that Bacon and Newton and many others always said that nature should be studied as a manifestation of the thought and wisdom of God. On the contrary, the student is instilled with the idea that the atoms and molecules, the electrons, protons, and neutrons, the chromosomes and the genes, have within themselves the powers and the wisdom by which they act. And this thoroughly pagan method of teaching natural science is, sad to say, just as prevalent in many so-called "Christian" schools as in those that are openly non-Christian.

But by thus ignoring God in the study of nature, we have only a crippled, one-sided system of education, one that has lost its vital spark for uplifting and regenerating. For whenever mere intellectual or technical skills are acquired, while the moral and the spiritual is ignored, more harm than good must result; for such an education merely puts increased powers in the hands of men and women who do not know how to use them for the good of the world.

Thus it comes about that so many are becoming alarmed

over the dangers to civilization which now loom up as the result of the greatly increased powers over nature which our generation has acquired. Many are now saying that man has gained all this wonderful power over the resources of nature, while he is still a savage at heart. He has become a giant in strength, but has not learned that it is tyrannous to use this strength like a giant. His voice can sound round the world; he can sail in the stratosphere or under the ocean. But his voice is being used to stir up racial and class hatreds; while from the skies above and from the depths beneath all the forces of destruction are being unleashed for the extermination of millions of fellow beings. Modern paganized education has placed a set of automatic guns in the hands of an infant, a moral idiot—and this in a roomful of people. And not a single one of all this roomful knows how to restrain this baby idiot in his amusement of trying out his toys on the panic-stricken people around him.

The Christian methods of studying nature could not fail to have an uplifting influence, but modern science has too often been completely secularized and divorced from religion and character training, and there is nothing uplifting about nature study when the student is taught that the world has developed by natural processes to what it now is, and that the things of nature have within themselves the powers and the "properties" with which they act. This is nothing but paganism, and it must result in a recrudescence of the moral depravity of paganism, and be followed by the doom which overtook the paganism of old.

III

I have no complaint against the usual scientific explanations where a train of genuine second causes are obviously involved. When a man pulls a trigger and the powder explodes and a bullet is propelled and kills a bird, it does not

require any unusually persistent attempt at clear thinking to understand that God is not directly responsible for the death of the bird.

On the other hand, there are great numbers of events taking place all around us in which no possible second causes are involved. Such are the phenomena of gravitation and the other so-called "attractive" forces; also all the phenomena of radiation, such as light and heat. The same is conspicuously true of most of the processes of plants and animals, including those of our own bodies. In all these many and varied instances it is sheer blindness and theophobia to refuse to see the power or will of God directly manifested. I do not mean this in any pantheistic or mystical way, but literally. For in spite of all that science has done, or rather *because* of what science has done, every clear thinker knows that no materialistic explanation of these phenomena has ever been found, and cannot be imagined as even possible.

For instance, why does a stone fall to the earth when it is unsupported? The common answer is that this is due to the principle of gravitation, or to the law of gravitation. But what is this thing called gravitation, and what is meant by a scientific "law"?

Every educated person ought to know that a scientific "law" is in no sense whatever a decree or a necessity that things must act so and so. It is simply a statement of some regularity which we have observed taking place in nature. In other words, it is a merely human statement of some regularity in nature that seems to take place always in the same way under specific circumstances. Often it can be stated in strictly mathematical form. But since the very highest philosophical authority tells us that "no verbal statement is the adequate expression of a proposition,"[3] it follows that all our scientific "laws" may be, after all, a very inade-

[3] A. N. Whitehead, "Process and Reality," p. 20. New York: The Macmillan Company, 1929.

quate or lopsided expression of the truths of God's management of the natural world.

But what is this thing called gravitation? The dictionary defines it as the force which draws all bodies of the universe toward one another. The ways in which this "force" acts can be worked out mathematically, and are found to be true under the observed circumstances. Whether we are already familiar with all the possible "circumstances" in God's universe may be another matter.* But what is a "force" as used in this connection? It is defined as that which tends to produce motion or a change of motion in a body.

Now, by combining these two definitions, we find that an unsupported body falls to the earth because of some *tendency* which is supposed to exist in all bodies, and which is said to *cause* them to act thus.

If someone should rise to defend this as the "scientific method," then I would reply that such a scientific method must be a pretty poor and paltry affair. As we have already seen, neither Bacon nor Newton was ashamed of allowing his scientific work to lead up to God as the great First Cause of nature's phenomena. Many more first-rate scientists might be named as of the same opinion. But in our day an intolerant mechanical philosophy has pre-empted all the ground in our educational systems, and has banned all mention of God in connection with the study of natural science.

IV

But let us examine somewhat further this problem of gravitation. Did you ever try to think out some genuinely mechanical explanation of the so-called pull of gravity?

* "The history of thought shows that false interpretations of observed facts enter into the records of their observation." "Every scientific memoir in its record of the 'facts' is shot through and through with interpretation."—*A. N. Whitehead, "Process and Reality," pp. 13, 22.* Professor F. C. S. Schiller repeatedly makes the same or similar statements.

Since every two bodies in the universe seem to "attract" one another according to the mathematical formula of inverse squares, the moon and the earth may serve as examples. Now, just how does the earth reach out and put hooks on the moon and pull it in toward itself? Remember, this is *action at a distance,* or an action across apparently vacant space. And how can we picture any body as acting at a distance, or acting where it is not, as evidently seems to be the case in this instance?

As is well known, Kepler, Faraday, and J. Clerk Maxwell used to postulate some sort of demon or spirit or angel to manage such action at a distance. Others have invented various imaginary ethers to serve as some sort of bridge across the interval between bodies, with the hope that thus the problem of action at a distance might be solved. One after another these ingenious constructs of the imagination have failed to stand the test of critical examination, until today they have very generally been abandoned.

Newton did not regard his own theory of gravitation as involving anything beyond the statement of strict observational fact. As a recent English writer states the case:

"He [Newton] did not present it [gravitation] as explaining the mutual attraction of bodies for one another. He did not see that he was required to give such an explanation. What he had given was a mathematical description of the way bodies actually behaved. He did not profess to say *why* they behaved in that way. As a matter of fact, he did not think that science could give an answer to that question, since he thought gravitational action due to the direct activity of God."[4]

In our day, as a result of a resolute endeavor to leave God out of all scientific discussion, some modern scientists frankly admit that they cannot explain this matter of gravity and other forms of action at a distance. Says Professor E. P. Lewis of the University of California:

[4] London *Times* Literary Supplement, March 17, 1927.

"We do not know, nor can we ever expect to know, the mechanism of gravitation."[5]

Sir Joseph Larmor, eminent English scientist, declares:

"No progress has been made, any more than in Newton's day, in unraveling the essential nature of gravitation."[6]

But the fashionable method, of course, is to say that "space" is a "field," and is thus capable of exerting all the phenomena associated with what is termed gravitation. But even this does not furnish any rational explanation. Here is a confession to this effect from a well-known astronomer:

"The absence of any visible connection between the earth, which is seemingly responsible for the pull, and the body itself, has never ceased to puzzle mankind. Many theories have been proposed to explain the mystery or to express the interaction in mechanical terms, but we have gradually begun to realize that we are dealing with properties [?] of matter and space, so fundamental that mechanical pictures or models are inadequate, erroneous, or misleading. Modern physics does not try to 'explain' gravity; it expresses the laws according to which it acts, and regards its existence as one of the most fundamental properties of matter in its relation to the space and time of the universe."[7]

When the Michelson-Morley experiment convinced physicists and astronomers that there is no such stuff as the ether filling interplanetary space, the theory of relativity was invented to express mathematically the relationships between the various bodies of the universe without any ether. But it is an utter confusion of thought to suppose that the equations of Einstein or of the dozen-odd men who have imitated him have "explained" gravitation. It is one thing to state physical relationships by mathematics, and quite another thing to give a rational *cause* for the behavior of the bodies involved.

The point we have been considering is vastly more im-

[5] *Science*, November 23, 1923, p. 410.
[6] *Nature* Supplement, April 9, 1927, p. 52.
[7] Gustaf Strömberg, "The Soul of the Universe," pp. 32, 33. Philadelphia: David McKay Company, 1940.

portant than the mere problem of gravitation, important as that is in the mind of every thoughtful person.

First, all the so-called attractive "forces," such as cohesion, adhesion, magnetism, and chemical affinity, are also involved in the problem of action at a distance, for they are all pulls, not pushes. They may act at minute distances, instead of across astronomical space; yet the logic is exactly the same; they, too, are incapable of mechanical or material explanation, and can only be rationalized as being due to the fiat control of the God of nature—regular and invariable, not because of any inherent "properties" in the things themselves, but because God Himself is punctual and reliable, and always keeps faith with His creatures.

But two other large groups of facts are similarly without any mechanical explanation, and must also be assigned to the immediate (that is, "without any medium") fiat activity of God. I refer to the various forms of radiation, such as light, heat, electricity, and wireless, in the field of physics, and the behavior of the cells and all the processes of plants and animals. These must be considered in some detail presently. But all the forms of radiation at least are capable of being transmuted and transformed into one another back and forth, according to the well-known laws of the correlation of forces and the conservation of energy; so that if we need the direct fiat action of God to account for some of these phenomena, it will be difficult to avoid saying that this direct control of God must also extend to all the other phenomena of the universe.

But, as I have said before, all this is not to deny the reality of second causes. The will of man is a true cause, or is the means of initiating movement in the world outside himself; though of course man is only a second cause. And to a lesser degree the living things below man in the scale of existence are also capable of being causes, for even an amoeba or a paramecium will pick and choose among its surround-

ings. Again, invisible to us, there are spirit beings who are doubtless able to initiate movement or action in the natural world, these spirit beings including both the good and the bad, just as we see among men. But outside of these genuine second causes, I believe we have a right to say that *all* the phenomena of the universe should be regarded as due to the direct, or fiat, control of God, the Creator and active manager of the universe.

V

But let us make a further advance now to a consideration of those phenomena which come under the head of radiation, or manifestations of energy, such as electricity and light. For we shall find in this department of the subject the same anti-Christian, materialistic tendencies, although all the highest authorities admit that these phenomena can never be explained on the materialistic basis as being due to inherent "properties" and "forces" in the things themselves.

At the outset of our study we meet with a serious difficulty in the matter of what definitions we are to adopt. For while we do not meet such a difficulty in the study of gravitation and the molecular attractions, the definitions of electricity, heat, light, etc., are in a state of absolute chaos. All agree in calling them manifestations of "energy;" but beyond that there is little agreement in regard to how to define them; and nobody knows what "energy" is, unless it is a manifestation of the direct power of God. The dictionaries and some textbooks that claim to be "modern" still maintain that an "ether" pervades the entire universe, and use this imaginary "ether" in their definitions of electricity and all forms of radiant energy. Others, who have outgrown this hypothetical ether, cannot agree among themselves on any adequate definitions of these varied and perplexing phenomena.

According to the rules of their game, professional scientists think themselves obliged to assign material or ob-

jective "causes" for all phenomena. This is where the trouble comes in such matters as gravitation, or the transmission of light, and other forms of radiation. Since the ether has failed them, they have been driven to a sort of introversion; and by intensive experimentation with what they think are the minute components of matter, they have bemused themselves with the idea that matter and energy are interconvertible, and the distinction between them ceases to have any meaning. Now, with a luxuriant crop of new forms of mathematics, they think that they are on the verge of discovering, not only the ultimate composition of matter, but how the universe was evolved in the first place. As a result we are having a veritable orgy of "discoveries" regarding the ultimate composition of that invisible thing the atom, until this once-indivisible unit of nature seems in a fair way to be found as full of different kinds of "particles" as space was formerly full of different kinds of "ethers," each inconsistent with and contradictory to all the others.

It is in this way that the true meanings (for the Christian) of such phenomena as electricity, light, and wireless are being obscured or confused for ordinary people, or even for people of considerable education.

I have mentioned the difficulty of finding definitions for electricity and light upon which scientists can agree, but all ordinary people have reasonably clear ideas of what is meant by these terms. So without here attempting any formal definitions, we may pass on to a study of the behavior involved.

Perhaps as good a method as any of presenting this subject is to quote at some length from Dr. Willis R. Whitney, vice-president of the General Electric Company, as given in an interview a few years ago. Whitney was at that time director of the research department of the General Electric, in which he had about five hundred college graduates working under him in research work. When speaking about the prob-

lems that arise in advanced research in electricity, Doctor Whitney said:

"We have discovered that the deficiencies in our grasp of electricity are so many that one hesitates to claim that we know anything fully. However, it is pretty clear today that no matter what electricity is, it seems to be the ultimate essence of what everything is made of, and by which most processes occur."

The interviewer asked what this ultimate essence really is.

" 'We have our theories,' answered the scientist, 'but can't prove them.' He picked up from his desk a small bar magnet. 'Bring this near to a steel needle, and the needle will leap to the magnet. No one knows why, but we have worked out elaborate explanations. We speak of lines of force, we draw a diagram of the magnetic field. We know there are no lines there, and "field" is just a word to cover our ignorance.'

"He laid the magnet over a wooden base in which was embedded another bar magnet, and the upper magnet floated in space about half an inch above the base.

" 'What supports it? Sir Oliver Lodge says it is the all-pervading ether. But Einstein denies that there is any ether. Which is right? I say that the magnet floats in space by the will of God. The magnet repels another magnet by the will of God. And no man today can give a more precise answer.'

" 'What do you mean by the will of God?' I asked.

" 'What do you mean by light?' shot back the scientist. 'A beam of light comes speeding from a star, traveling hundreds of years, and finally it reaches your optic nerve, and you see the star. How does it do that? We have our corpuscular theory of light, our wave theory, and now our quantum theory; but they are all just educated guesses. About as good an explanation as any is to say that light travels by the will of God.

" 'The best scientists,' he added, 'have to recognize that they are just kindergarten fellows playing with mysteries—our ancestors were, and our descendants will be.' "[8•]

[8] New York *Times* Magazine, November 2, 1930.

[•] Some may be interested in learning that Doctor Whitney himself sent me a photostatic copy of this interview in the New York *Times;* so the statements here given may be considered fully authentic.

All this is a candid and truthful statement of facts, as recognized by one of the foremost men of science in America. It is needless to point out that these statements lend no support to the widely held theory that matter has within itself the power to act as it does.

But the sad and shameful fact is that no hint of such views as those so well expressed by Whitney are allowed to filter down to the high-school and college textbooks, from which all the youth of the land get their "science." In a few cases these textbooks will admit that there are some things which science has not yet solved; they may even permit the student to see some of the inevitable limitations of the scientific method. But each and all carry the same old pagan, materialistic assumptions, *that matter has within itself the power to bring about all the processes of nature.* But if this is true, Christian schools and Christian churches might as well close shop.

Under this modern deism or pantheism, the young student is led along to believe in a universal determinism, hard and cruel, in which the iron laws of Nature (usually capitalized) grind on, "awful with inevitable fates." Not only is prayer ruled out as being about as useless as invoking the east wind, but God, if He exists, becomes the great absentee landlord, and there can be little hope of eternal life at the end.

But what are the Christian parents of America going to do about it? I feel it difficult to use temperate language in the presence of a situation like this in a land that professes to be Christian. Why should the Christian parents of America, also the small army of enlightened Christian teachers of science, resign themselves to the present situation, as if it were inevitable, like the weather, about which people may talk but never do anything? In some instances, at least, the situation can be remedied, and steps should be taken to do this remedying.

VI

Before we proceed to consider the behavior of living things, which has always impressed reflective people as being due to the direct working of God, I must prepare the way by some brief remarks about the abuse of abstract terms; for if such words as "gravitation" and "attraction" and "electricity" become mere anodynes of thought, paralyzing the mental processes, what are we to say of the "tropisms" and "instincts" and the whole kit of terms used in biology to keep the student from recognizing the direct working of the God of nature?

John Dewey says that the evidence of history proves that it "is dangerous" to think in abstract terms. For this habit of abstraction tends to elevate ideas above the situation in which they originated, where they seem to be true, and endows them with dangerous powers for the future.[9]

By an abstract term we mean the opposite of a specific or concrete term. The noun "man" and the adjective "human" are specific or concrete, but the word "humanity" is abstract. In other words, when we neglect or pass over most of the specific aspects of an idea, and concentrate on its most general aspects, and give these generalities *a name,* we are dealing with an abstract idea; and the danger lies in the tendency to treat such an abstract idea as a real entity. To do so is an example of what McDougall calls the "reification of words," or treating mere words as if they have an objective existence of their own.

But there can be no more dangerous mental habit than this of treating such abstract terms, mere constructs of the mind, as real entities. In the first place we think we understand just what qualities or meanings we have put into them.

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[9] See John Dewey, "German Philosophy and Politics," *passim.* New York: Henry Holt & Company, 1915.

But a little later someone else will be using the same abstract term with the set of meanings which he has put into it—meanings which may be considerably different from those originally given it. And thus, when both of us talk together about this abstract idea, we are sure to develop misunderstandings, for we are not using words with the same meaning.

Some of these differences and consequent misunderstandings arise because of the nature of the human mind to inject what it *wishes to be true* into the abstract terms which it uses. For the wish or the desire tends to color the meanings which the mind attaches to these abstract terms. And when we allow ourselves to treat our abstract terms as real entities, having an existence apart from our minds, we are bound to get into trouble in one way or another. Indeed, this may be said to be the chief cause of the present muddled thinking in this whole field of science in its relation to religion.

Let me illustrate. We see growth and change going on all around us. Every plant and every animal grows from the little to the big, from the simple one-celled stage to the many-celled stage of maturity. All nations have grown from small beginnings. The face of the country was very different a hundred years ago, and still more different five hundred years ago. We dig up bones of gigantic animals which lived long ago, or sea shells are discovered by the thousands in the strata of the highest mountains. All these things are proof of changes and differences between the past and the present. Then we reason that by means of these and similar changes we can explain the entire growth and development of the world in terms of the natural processes now going on. And all this means *evolution.*

It is all just as simple and easy as that—and just as false and unreasonable.

But isn't there clear evidence for this growth and development?

Yes; there is much that may be interpreted in this way.

But there is also *more* evidence and much *stronger* evidence on the other side.

Then how are we as rational beings to decide what is what in these matters? How may we know what is genuine truth? We must decide by the weight, the preponderance, of the evidence. A case being tried in court must have evidence presented *on both sides.* How do the judge and the jury decide the matter? By the preponderance of the evidence. There is no other way.

But in all the difficult problems in regard to man's duty and destiny, how the world began, how it is now being conducted, and how it will end, we have not been left alone to find our way in the dark by means of the taper lights that we can furbish from the perplexing and conflicting evidences from science and human discovery. The God of heaven has given us written instructions; so we need not go astray in our reasoning about these matters. For in all such thinking or reasoning about the origin of the world, or about how the affairs of nature are now being conducted, we can make no progress without very soon getting out into the deep waters of abstract reasoning. And here is just where we need to be very careful in our reasoning and in the words we use, and in addition we need to check up from fundamental truths revealed in the Scriptures, to make sure that we are not making mistakes on all these subjects.

But isn't it right for us to study nature at first hand—the flowers, the birds, the stars, and the rocks with their fossil contents—and try to understand all we can about them by the best scientific methods? Of course. But we should remember all the time that we cannot safely try to reason widely or deeply about any of these things without informing ourselves very fully about *both sides* of the problems. If we are to know the truth, we must decide by the weight of the evidence; that is, provided we can get at all the facts involved, or all the facts pertinent to the subject we are studying. And

in case we can't master *all* the facts involved (and what human being is able to know *all* the facts on *any* subject of nature?) then we have God's written instructions to keep us straight in our thinking. To trust to any supposedly expert scientific authority in such matters is comparable to the way in which the people of the Middle Ages trusted to the priests in all religious and temporal things.

Of course God expects us to study the things He has made, and to study them deeply and according to the best scientific methods. And in all matters within our ability to discover from observation and reasoning, He expects us to decide the problems we meet strictly according to the best evidence, by the weight of all the evidence available. But the Good Book tells us that if a man "giveth answer before he heareth, it is folly and shame unto him." Prov. 18:13, R. V. Which is, of course, just the Biblical way of warning against what is called incomplete induction or jumping to a conclusion. For it is folly and shame to any man to decide any problem, in science, in everyday life, or in religion, until he knows all the available truth in the matter. And it is still worse folly and shame for a man to decide any matter in any way that directly contradicts what God has revealed about it; for He is the only being who knows the true answers to all the deepest problems of the universe.

VII

After what may seem to some of my readers a sort of excursus, we may proceed to consider some of the processes of plant and animal life which, for anyone who has not become befuddled with the "explanations" of the current mechanistic theories, have always been regarded as showing the direct management of God.

Let us begin with the behavior of the cells of which all organisms, including our own bodies, are composed. It seems

preposterous for anyone to tell us that these minute specks of protoplasm act as they do because of inherited *habit*—which is the best "explanation" that evolutionists can think up. This means that the behavior of the cells is a sort of inherited memory of previous acts of the same kind. This is the usual "explanation" for the wonderful acts which we usually attribute to instinct. We are told that "imitation" is the origin of some instinctive acts in animals—surely not in plants!

But every single cell in our bodies is directly descended from other cells which acted entirely differently, for all the cells of the developing embryo have each a special work of their own, very different from the work of the cells of the mature body.

Let us take a specific example. A controversy has long existed in regard to the way in which nerve cells grow out from the spinal cord to control the various organs. It has been commonly held that only after nerve cells have already grown up in the sense organ or muscle do the connecting nerves grow out from the spinal cord to meet them. But Wilhelm His, the eminent Swiss embryologist, believed that the nerves grow outward from the spinal cord straight for the place to which they are to function, just as a telephone wire might be strung out from the main office to the home which was to be connected with "central." The latter idea has been scoffed at by mechanists, since it looked too much like a planned affair which was being conducted intelligently by God Himself.

But recently Dr. C. C. Speidel of the University of Virginia was awarded a prize by the American Association for the Advancement of Science for settling this problem once for all in favor of the theory of the Swiss embryologist. Speidel, by some original technique, was able to watch under the microscope the living, growing nerve cells of a tadpole, which sprouted out from the spinal cord and went, as if with

intelligence and purpose, directly to the proper part of the body they were to serve.[10]

But how does the nerve "know" how to travel so unerringly to its proper destination? Remember, too, that each sensory nerve consists of a single nerve fiber which reaches from the sense organ to the central system, so that in the thousands of examples of such nerves, each one starts out from the cord with an apparently intelligent aim and purpose to go to the exactly proper spot, and to no other. Is it not a stultification of all our reasoning faculties to deny that we have here a clear manifestation of the directing care of the Creator Himself?

But if animal "instinct" is simply inherited habit, how are we to account for the instincts and habits of the worker bee? The hive is a highly organized community, with a very definite division of labor among all its members. The queen bee has the one job of laying eggs for the perpetuation of the colony. Neither the queen nor the drones gather a drop of honey. The worker gathers the nectar and the pollen, while squads of the workers perform all the other duties of keeping the hive in good condition. The worker is even structurally different from either its drone father or its queen mother, for it has special structures adapted to the gathering of pollen, and for caring for it and for the nectar of the flowers, which it converts into the honey with which we are familiar.

Is it not preposterous to attempt to account for the worker bee on any evolutionary theory? Where did it "inherit" these structures so indispensable for its job in life? None of its ancestors on either side of the house ever had them. And where did it get its wonderful "instincts," which lead it to gather and store the food for the colony in the exquisite cells which it makes expressly for the purpose? Every worker bee is descended from a drone father and a queen mother, each

[10] See *Science News Letter*, January 9, 1932, p. 19.

with very different structures and different instincts. The queen never gathered a drop of nectar in her life, and neither did the drone father.* *And this must always have been true as far back as we can imagine bees to have existed.* If instinct is only inherited *habit,* why doesn't the worker bee have the habits of its lazy old father, the drone, who is a mere "cake-eater," hanging around the house all his life, and never doing a tap of useful work? Why does the worker bee always know how to do its work from the very start?

All materialistic "explanations" stand abashed in the presence of such structures and instincts as we see in the honeybee. But there are three other groups of social insects: the wasps, the ants, and the termites, each divided into many genera and species. But each of these groups of creatures shows just as wonderful and just as unaccountable facts in the way of structures that the ancestors never had, and instinctive habits of marvelously accurate wisdom that none of the ancestors ever exhibited. It seems almost like a deliberate bribe to our intellectual honesty to be approached with offers to "explain" these facts by any evolutionary or materialistic theories.

VIII

But what is an instinct? and how are we to account for it?

It is not easy to give a definition that will cover all cases and that will satisfy scientifically minded people, and that will be at the same time understood by ordinary readers. Perhaps some examples may serve instead of attempts at exact definition. We have already considered some instances; it will be well to consider a few more.

* This statement is true of the common honeybee, *Apis mellifica.* Among the fifteen hundred so-called species of bees, there are some species in which the queen is said to fend for herself for a time, gathering enough nectar for her own needs until she has raised some workers to wait upon her. But the statement in the text is true of the ordinary honeybee, and this is the one here spoken of.

Many of my readers will think of the perfectly "natural" way in which young ducks and goslings take to the water when they first see it, while young chicks as "naturally" avoid it. Perhaps both ducklings and chicks have been hatched by the same mother hen. And of course it is "instinct" also which leads this hen to show signs of horror and extreme anxiety when some of her children persist in going into the water.

But we also have to use the term "instinct" to cover certain movements of individual cells, movements which can be studied only under the microscope. When the grain of pollen lodges on the stigma of the right flower, it sends out a part of itself called the pollen tube by a crooked path down to the ovule, where pollen nucleus blends with egg nucleus, thus accomplishing the marvelous act of fertilization. Similarly the sperm of the animal, upon meeting the ovum by accident or by actually hunting it up, as often seems to be the case, unites with it, thus initiating a new creature. These processes of uniting two cells to make a new individual, and the opposite process of mitosis, or indirect cell division, are among the most wonderful in all nature. But as they can be studied at first hand only by means of elaborate technique, and by the use of high-powered microscopes, very few people, though otherwise well educated, are familiar with them. I for one refuse to believe that these processes can be rationally understood without bringing God into the picture.

The migration of birds is more familiar. For many years such birds as swallows have been timed in their coming and going, and they have been found to be punctual almost to the precise day. By a system of banding and marking, the crowned sparrows were observed and recorded on the campus of Stanford University, and it was discovered that these birds have a very fine sense of locality. When they return from British Columbia or Alaska to winter in California, they maintain the *same flock association* about the campus, al-

though in their northern breeding places these flock associations are all broken up.[11] How they find their exact locations within a few acres of their former home *as a flock,* after being all mixed up in the northern breeding grounds, is the puzzle. And of course many of us are familiar with swifts, robins, and other kinds of birds that return year after year to the very same nesting places.

The mere length of some of these annual migrations is noteworthy. Some of the terns have their summer homes in the Arctic and winter in California or in the Southern States. The bobolink summers in Maine or Eastern Canada and winters in Florida or even in the heart of South America. The golden plover summers in Labrador and the extreme Arctic and winters in Patagonia or the extreme south of Africa, or even in Australia and New Zealand.

Jeremiah spoke of the divine guidance by which "the turtle and the swallow and the crane observe the time of their coming" (Jer. 8:7, R. V.); and all through the Bible these and similar acts are always assigned to the guiding providence of God. And there would be much more intelligent faith in the Creator and His untiring care for all the parts of His universe, if our modern students of science in high school and college never heard of "tropisms" and "instincts" of multitudinous sorts and pseudoscientific names.

Even in these more sophisticated times, the sight of a migrating flock of birds can hardly fail to call forth remarks of wonder and reverence. William Cullen Bryant, just twenty-one years old and fresh out of law school, poor, unknown, and seeking a new village where he might set up for himself in a line of work that was not much to his liking, was reminded of the great truth that God has the plans and destinies of men within His charge, as he watched a black mallard duck pass across his vision in the afterglow of a

[11] See *Nature,* January 14, 1933.

springtime sunset. In lines that are familiar on several continents he pictures the bird pursuing its solitary way amid the rosy depths of the evening sky, and follows with the lesson of personal trust:

> "He who, from zone to zone,
> Guides through the boundless sky thy certain flight,
> In the long way that I must tread alone,
> Will lead my steps aright."

In a scientific discussion such as this it may seem out of place for me to dwell on the exquisite finish of this poem, "To a Waterfowl," which Hartley Coleridge, no mean critic, pronounced the best short poem in the English language, a poem that drew enthusiastic praise from even so cold and unsympathetic a judge as Matthew Arnold. What I wish to point out is that Bryant's sentiment of reverent worship at sight of the picture he describes is the *true* one, the Christian one, the one that such a sight ought to call forth in the mind of every normal human being, who has not been contaminated by the modern false philosophy, which, in the words of Keats, would unweave a rainbow or clip an angel's wings.

Some have tried to "explain" these migrations of birds as being due to imitation, the young ones following the older ones. This will hardly apply in those cases in which the younger ones are proved to precede the older ones; and it has no bearing on the migrations of certain butterflies and moths, which travel hundreds or even thousands of miles. And this theory sounds like nonsense when applied to the life histories of some of the fishes, like the salmon and the eel.

The salmon is hatched in the clear, well-oxygenated waters of the upper fresh-water streams, but when partly grown it migrates down river to the ocean, and lives the most of its life in the salt water, returning, however, to the upper fresh waters to spawn. Yet even so unimaginative a creature as a fish is credited with a "homing instinct," for there is evidence that—

"the great majority of Pacific salmon, as well as some species of trout, seek and usually find the stream in which they grew up as babies; even though a few intervening years were spent in the far-away sea and entirely outside the influence of the 'parent stream.'"[12]

Almost as if to preclude any attempt at explaining these fish migrations on any materialistic basis, the common eel reverses all this style of life; for it is hatched in the deep, dark waters of the middle Atlantic, but spends most of its life in the fresh-water streams of America and Europe. The European and American eels are almost identical, except that the American has seven less vertebrae in its backbone, and passes through its larval stage in slightly less than a year, while the European takes two or three years. But though both appear to be hatched in about the same parts of the depths of the Sargasso Sea in the North Atlantic, no American eel has ever been taken in the streams of Europe, nor has a European form ever been captured in Canada or the United States.[13] All of which would seem to prove that these eels in their "homing instinct" must have as sharp a sense of locality as have the birds.

But the young eel that swims a thousand miles or more across the ocean and then makes its way against gigantic obstacles up some fresh-water stream, is an absolute pioneer; it has no older ones to guide it, for no old eel that descends the stream to spawn in the ocean ever returns. It is always a fresh generation of young ones that migrate up the rivers and streams; these eels have never gone this way before. When fully mature, after several more years, both males and females will go downstream again, out to the mysterious depths, and there end their life cycle.

A volume might be written about the wonderful behavior of insects and others of the lower forms of life. Many kinds

[12] Annual Report of the Smithsonian Institution, 1937, p. 366.
[13] See Austin H. Clark, "The New Evolution," p. 131. Baltimore: The Williams & Wilkins Company, 1930.

of insects go through several metamorphic stages, these stages being often very different from one another. The mother insect that lays the egg is usually wholly oblivious of the forms that issue from it, and usually never sees them. Yet it is the common thing for the mother butterfly, moth, or other insect to select some plant as the place to lay her eggs which she is not interested in at all as food, yet which may be the only kind of plant that her unborn young can or will eat when they emerge from the egg. The mother herself may subsist wholly by sipping a little nectar, or she may never eat at all during her stage as a flying insect, while the young, when hatched, may subsist entirely on the leaves of a certain kind of plant, and be ravenous eaters. But the mother with the utmost care will select just the kind of food that her young will want to eat, although she herself may never see them at all, as she dies before the eggs are hatched.

I repeat, this behavior is a very common thing among insects, and occurs in hundreds or thousands of kinds. But materialistic science has no believable explanation for such conduct.

IX

I have space in this chapter for only one specific example. It may seem very clear and impressive in the lessons that it teaches, but I would assure my readers that it is in its general principles quite typical of almost innumerable instances that might be adduced from the insect world, though of course with many varying details.

All people who live in the southwestern part of the United States are familiar with the desert yucca, with its long pointed leaves and its massive panicle of whitish bell-shaped flowers. There are several varieties, but one of them, known as *Yucca gloriosa,* has long been famous among botanists because of the way in which a certain *Pronuba* moth accomplishes the cross-fertilization of the plant, without which

cross-fertilization the seeds would not mature, and the species would soon become extinct. Very many plants seem to be thus dependent upon some special insect for their fertilization.

The yuccas are natives of the arid highlands of the southwest section of the United States and Mexico. They belong to the lily family, but they often attain a height of six feet or more before they blossom, the gigantic bunch of fragrant blossoms which they send up often rising twice this height. A yucca thus in full bloom is a magnificent spectacle. Botanists have discovered that the flowers are quite incapable of self-fertilization; pollen from another floret must in some way be carried to the pistil, in order to render the seeds fertile. Three quarters of a century ago some botanists discovered that the act of carrying the pollen from one flower to another was performed by the *Pronuba* moth, whose acts in all details seem to be done with a definite purpose and humanlike intelligence, though it would be preposterous to say that the moth is conscious of *why* she *acts* as she does.

Just about nightfall, as the flowers of the yucca are first opening, numbers of the moths, both male and female, may be seen flitting about among the panicles, the male being more constantly on the wing and the female more frequently alighting and running around within the flowers. By watching carefully we may see one of the females sitting astride one of the stamens, from the anther of which she scrapes off a mass of sticky pollen with her queer-shaped palpi, or feelers, and then rolling this pollen into a ball beneath her head.

She then takes this ball of pollen, which may be even larger than her own head, and flies with it to another yucca flower, which she examines in an excited, hurried manner. If she is satisfied with her inspection, she settles down above the ovary, or the base of the pistil, and with the tip of her ovipositor she pierces the tissues of the pistil and deposits an egg among the little ovules. This operation may be repeated

several times on the same pistil, several eggs thus being placed where they are to hatch.

All this time she is still carrying the ball of pollen with her. But now, as a finishing touch, almost as if she understands the scientific meaning of all her work, she goes to the top of the pistil and with her tongue and palpi crams a wad of the ball of pollen into the stigmatic tube at the end of the pistil, even working her tongue up and down in this tube like the ramrod in a gun. This pollen ensures the fertilization of the flower.

This entire series of operations may be repeated over and over again the same evening, always in the same sequence, the moth working industriously at her task till late at night. She is said to discriminate among the flowers, selecting those that have only recently opened and that have not been used by another moth. All ripe seed pods of the yucca always show one or more scars or constrictions on their sides, the results of the puncture of the moth's ovipositor. The seed pods that have not been thus treated never mature.

Inside the developing ovary the larva of the moth hatches and grows, taking a toll by devouring perhaps a dozen of the young seeds (though plenty more remain). When the larva is mature, it eats its way out and drops by a silken thread to the ground during some dark night; then it digs its way into the ground and wraps itself in a strong cocoon. It may remain in this cocoon stage a year or more.

An important part of this remarkable story is the fact that the times of the emergence of the moth and the blossoming of the yucca synchronize so well, and each is ready for the other at the proper time of year. But as is the usual case, this moth does not eat any part of the yucca flower, or eat anything else in this period of her life, so far as is known. Her sole business during this brief stage of her existence is to lay her eggs. When this part of the plan of nature has been performed, accompanied by the fertilization of the

yucca, she dies, never, of course, seeing her offspring for which she has provided so carefully.

How utterly preposterous are all theories of Darwinism and materialism in the presence of facts like these. Here is a plant which cannot perpetuate itself without the help of this particular kind of insect, while the moth itself cannot perpetuate itself without this particular plant. So the moth with skill and accurate precision goes through a complicated series of operations which ensure both the future of the plant and the future of its own unborn offspring.

What a stultification of all common sense to try to "explain" this *planned interdependence* of insect and plant life by the random happenings of chance and the struggle for existence.

"O Lord, how manifold are Thy works! in wisdom hast Thou made them all: the earth is full of Thy riches." Ps. 104:24.

This is not wholly true now; it is partly prophetic. It looks forward and expresses the triumphant future in the vivid present tense to indicate the certainty of the outcome. All of God's plans are as inevitable as if they were already accomplished. But what a happy world this might have been if all human beings from the beginning had always remained as fully synchronized with the wireless of heaven, as obedient to the voice of their Maker, as many of the animals still are. Thank God, this will one day be the case.

CHAPTER FOUR

The Living and the Not Living

I

IS there a radical difference between the living and the not living? And is there no possible way known to modern science to produce living things out of and from the not living by experimental or artificial means?

All living plants and animals make use of the not-living chemical elements; they live upon them and by means of them. But absolutely, and without one single exception, so far as scientific observation and experience have discovered, never within the entire history of the earth has a single living thing come into existence without being derived from some previous living thing.

This great principle is known as the law of *biogenesis;* living things come only from other living things, never from the "dead" chemical elements by any process known to man. It is often called Harvey's dictum, for the noted physician and scientist William Harvey (1578-1657), the discoverer of the circulation of the blood, used to express the principle in Latin: *"Omne vivum ex vivo,"* or, "Life only from life."

But millions of people apparently can know all this without comprehending what a problem it poses for the thoroughgoing evolutionist and for all those who seek to deny God's original creation of the living things which we see around us. Indeed, a considerable acquaintance with scien-

tific methods and scientific facts seems necessary to enable anyone to realize that there is any problem at all about biogenesis, the genesis or origin of *bios,* or life. Most ancients, like so many unthinking moderns, were on so low a plane mentally that they recognized no problem concerning the origin of the living things now on earth; they just took it for granted that they had always been here. Aristotle and others of the Greeks were on a little higher level; they recognized that there was such a problem, but they solved it easily by assuming that all the smaller forms of plants and animals were continually springing up spontaneously from the moist earth even then, and that doubtless in the dim shadow of the long ago, the larger kinds must also have done the same. They thought that so long ago as that almost anything might have happened.

Yes, they were consistent and believed that man also had originated in this "natural" way by generation from the earth. Their word for native sons was "autochthons," meaning the sons of the soil where they dwelt. We in modern time may use these terms in a figurative or poetic way, but the Greeks meant it literally. Being heathen, with but little reliable history previous to their own times, they assumed that the various races and nations that lived in other parts of the world were autochthons of the lands where they dwelt, unless they had some evidence that they had migrated there. And the histories of Greece tell us that the nobles of Athens used to wear golden grasshoppers as badges, to show that they were the native sons of Attica. The logical connection between this idea and the golden grasshoppers was far-fetched; it was connected with their heathen mythology, and is not of importance in this connection. The important point is that these clever, inquisitive Greeks had what they considered a perfectly "natural" explanation of the origin of mankind without any Creator. And in this way, without having built up any detailed or long-drawn-out explanation, such

as our modern evolutionists have done, they had at least made a good start on a naturalistic theory of evolution by their theory of the spontaneous generation originally of all the various kinds of animals.[1]

But it was the work of Louis Pasteur (1822-1895) that finally settled the problem of biogenesis, that living things must have been created in the beginning, for they are not now being generated spontaneously from the not living. To him we owe not only our modern methods of preserving foods in sealed containers, but also our asepsis and aseptic surgery, together with our knowledge of how to protect against bacterial infection. The world seemed to get along fairly well after a fashion while believing in spontaneous generation, but what a horrible condition of affairs it would be if this pagan—and evolutionary—doctrine were really true.

I quote a few statements from Charles Singer:

"By 1859—the year of publication of the 'Origin of Species' —Pasteur was engaged in acute controversy on the question of the 'Origin of Life.' . . . In a few years, with a magnificent series of studies, Pasteur so cut away the foundation of the doctrine of spontaneous generation that it crumbled into ruin."[2]

After describing a crucial experiment which Pasteur carried out in 1861, this historian says:

"The success of this experiment marks the downfall of the doctrine of spontaneous generation."[3]

Since that day greater refinements of technique have been devised for securing and maintaining pure cultures—that is, for preventing the eggs or spores of other living organisms from contaminating our experiments, methods devised chiefly by John Tyndall (1820-1893), the English

[1] The history of this part of the subject will be found in Nordenskiold's "The History of Biology," pp. 430-435, and Charles Singer's "The Story of Living Things," pp. 430-456. The latter is written from the medical point of view, but it is not nearly so full or so thoughtful as the former.
[2] Charles Singer, "The Story of Living Things," p. 439. New York: Harper and Brothers, 1931.
[3] Id., p. 441.

physicist. The latter was a clear writer and a delightful lecturer, and his work "marks the final abandonment by men of science of the doctrine of spontaneous generation."[4]

II

It is interesting to note how all the early teachers of organic evolution were believers in spontaneous generation. Lamarck, of course, taught it openly, and never knew any better. Charles Darwin had been taught it from his early years by the doggerel verses of his grandfather, "The Temple of Nature:"

> "Hence, without parents, by spontaneous birth,
> Rise the first specks of animated earth."[5]

Haeckel, who lived until after the first World War (d. 1919), stuck to his belief in the theory until the last, as he looked upon it as "a logical postulate for philosophical natural science."[6] In a formal paper entitled, "Bathybius and the Moners,"[7] we find him defending the doctrine, and adducing Huxley's mistaken theory of the slime which some careless manipulation had found in water from the bottom of the ocean, as an example of this spontaneous origin of life.

T. H. Huxley, who was at once the most critically minded of the founders of the evolution theory and the most dexterous in arguing on both sides of almost any question, once declared that if he could look back beyond the limits of geologically recorded time, he would expect to witness life appearing directly from the not living "under forms of great simplicity." But in 1886 he declared:

"Those who take a monistic view of the physical world may

[4] Id., p. 442.
[5] Quoted by R. H. Murray in "Science and Scientists in the Nineteenth Century," p. 144. London: The Sheldon Press, 1925.
[6] Erik Nordenskiold, "The History of Biology," p. 510. New York: Tudor Publishing Company, 1935.
[7] Reprinted from the German in *Popular Science Monthly*, October, 1877, pp. 641-652.

fairly hold abiogenesis [spontaneous generation] as a pious opinion, supported by analogy and defended by our ignorance."[8]

August Weismann (1834-1914), too, declared that in spite of all the scientific demonstration of its impossibility, spontaneous generation "remains for me an absolute necessity."

But I cannot find any well-reputed biologist of today who will admit spontaneous generation as even a "pious opinion;" they are all without any exception on the opposite side.

As was remarked above, the denial of the possibility of life's coming from the not living in any natural way is an attempt to prove a negative; and it is notoriously difficult to prove a negative. All that science can say is that within the knowledge of modern science, life has never come from the not living. P. C. Mitchell states the case from this point of view in his article on "Biogenesis" in the Encyclopedia Britannica:

"No biological generalization rests on a wider series of observation, or has been subjected to a more critical scrutiny, than that every living organism has come into existence from a living portion or portions of a pre-existing organism."[9]

Or let us take the testimony of an ardent evolutionist who wished he could believe the opposite:

"For twenty centuries philosophers held that life was being constantly and spontaneously generated (*spontaneous generation*) out of inorganic matter, or that it arose out of dead animals, or developed as worms in the intestines of animals. . . . On the basis of established facts in biology, it can be said that we know nothing of a positive nature as to the origin of life. It is the greatest of the unsolved problems confronting man."[10]

But clearly this problem can be spoken of as "unsolved"

[8] Quoted in "Evolution in the Light of Modern Knowledge," p. 113. London: Blackie & Son, Ltd., 1925.
[9] Encyclopedia Britannica, 11th ed., Vol. III, p. 932.
[10] Charles Schuchert, "Textbook of Geology," pp. 411, 412. New York: John Wiley & Sons, 1915.

only on the basis of "naturalism," or materialistic evolution. Only by exercising a strong will to disbelieve in creation can the origin of life be regarded as unsolved. For if there is any problem that *has been solved* by natural science, it is that living things did not come into existence in the first place by any of those modern-acting processes or laws that we call natural. And this demonstration of an original creation has been accomplished, as Schuchert himself admits, only as the outcome of twenty centuries of study by men of science who believed the opposite.

Accordingly, in this fifth decade of the twentieth century, when we hear of Professor So-and-So who has been performing some chemical experiments by which he thinks he has *almost* succeeded in making protoplasm in a test tube, we can readily understand that it is just another case of the strong will to believe something contrary to God's record of an original creation, and His decree that from that sublime beginning the various forms of life should go on reproducing, each "after his kind."

III

But what is life? and what are its characteristics?

It is important for us to remember that there is no such entity as *life;* there are only living organisms. Even biologists sometimes speak of these living organisms as consisting of a stuff called protoplasm. But is it accurate to speak of protoplasm as a kind of stuff or material which we can subject to physical and chemical analysis apart from the cells or units of life? As Professor J. H. Woodger says:

"This is a relic of the early days when it was really believed that a cell was a little drop of homogeneous jelly; but there is no excuse today for going on talking as if this were true, when everyone knows that it is false."[11]

[11] J. H. Woodger, "Biological Principles," p. 293. New York: Harcourt, Brace & Company, 1929.

The late E. B. Wilson was our foremost authority on the cell, and he showed that there is no such thing as a simple cell, but that on the contrary every cell is an elaborately organized affair, with complicated parts, each of which is essential for the maintenance of its existence. Its organization puts it distinctly above the chemical level, and whenever this organization is interfered with, life ceases, and then what is left is *not* what it was before. Accordingly, if what we try to analyze is to be called protoplasm, then we may properly say that cells are *not* composed of protoplasm. As Woodger properly remarks:

"If a large bomb is dropped upon a populous town, we might apply the term 'townplasm' to the debris which remained, but it would be a little absurd to say that towns were *composed* of such townplasm, and that from a sufficient knowledge of such debris it would be possible to gain an adequate knowledge of the organization of towns."[12]

These words are pertinent and timely, and may help us to understand some of the problems of heredity. For if the most elaborate examination of such "townplasm" could hardly be expected to explain why this particular town always used to vote Democratic, while all the other towns around always voted Republican, we may get a hint of why our optical examination of the chromosomes of the germ cell is hardly sufficient to tell us why this kind of cell always manifests just such hereditary traits, while another cell which looks wonderfully like it under the microscope always develops very differently.

IV

It was a study of the microscopic forms of life, the bacteria and the protozoa, that finally convinced the scientific world that these minute specks of life are just as far from the

[12] Id., p. 294.

not living as are any of the larger forms. They are in no sense whatever of haphazard origin, but persist or breed true exactly as do all the larger forms. In modern bacteriology we are able to maintain pure cultures of any kind we wish, confident that there will never be any pleomorphism among them, or one kind that changes over into other kinds. Even Lister, the father of aseptic methods in surgery, was misled in this respect, as was Naegeli from more doctrinaire prejudices. But it was Koch (1843-1910) who discovered the specific germs of tuberculosis and cholera, and who taught the world more careful methods in the study of bacteriology, that would enable us to maintain pure cultures for indefinite periods.

Modern studies in bacterial infections have shown that there are varying strains of the ones that produce certain diseases; for instance, there are certain strains of those that cause pneumonia which are much more deadly than others. But no informed person could suppose that any of these penumonia bacteria could possibly produce the symptoms of tuberculosis. And when we can trace some of our modern infectious diseases back to the days of ancient Greece and Egypt, when people died with the same symptoms as are shown in modern times, we have to acknowledge that these minute disease germs breed true, or persist unchanged, for an astonishing length of time.

In modern experimental breeding for the study of genetics, elephants have not been favorites; there is too much lag between successive generations. Even in the case of wheat, or peas, or corn, it is with difficulty and only by artificial conditions that more than one or two generations a year can be obtained. Hence guinea pigs, or mice, or rabbits are better. But *Drosophila melanogaster,* or the fruit fly, has become a favorite, because with it twenty-five generations can be produced a year. I shall have more to say about the results of these experiments; here I am dealing with the bac-

teria, which can give a new generation every hour or so, or, when all the conditions are favorable, every half-hour.

How many successive generations would be represented by the fact that tetanus, the plague, malaria, and other maladies showed the same symptoms in ancient Greece and Egypt as today, and thus must have continued unchanged down through the centuries? Someone fond of figuring may compute the number of generations represented by these two or three thousand years, if a new generation were produced every hour.

But all this is only a beginning. For the lapse of time since a certain old humpbacked priest of ancient Egypt left his mummy for modern identification of his Pott's disease, is only a tick of the clock, as compared with the incalculable ages (according to the computations of evolutionary geology) since the yeasts and other fungi left their marks on old Devonian rocks.[13] Many cases of fossil bacteria in stainable condition have been reliably reported from the Carboniferous and other fossiliferous rocks.

Here is a case of osteomyelitis in a reptile from the Permian:

"The present specimen which shows this interesting phase of pathology is a posterior dorsal spine of a reptile of the *Dimetrodon* type, and was collected in the Red Beds of Texas by Mr. Paul C. Miller, of the University of Chicago. The spine had been fractured near its base in a simple transverse break, the line of which is still evident, and from an ensuing infection a chronic osteomyelitis developed in the shaft of the bone, producing a sinus-filled tumefaction which is today so characteristic of that condition. This argues for the presence of infective bacteria during the Permian such as have been demonstrated by the magnificent researches of Renault in the Palcozoic of France."[14]

If all living things are as mutable, or subject to change,

[13] *Science* Supplement, May 30, 1930, p. xiv.
[14] Roy L. Moody, in *Science*, April 8, 1921, p. 333.

as Darwin used to teach, why, in the name of science, have these many and varied forms of life persisted thus unchanged during all these ages? Every intelligent man must acknowledge that there is overwhelming evidence for stability or fixedness among multitudes of different kinds of life. If one is to stick to the evolutionary theory of a tendency to change among species in the course of time, he must also acknowledge that stability or fixity is also one of the most outstanding characteristics of living things.

The Lingulas and other brachiopods that have persisted unchanged to the present day from the time when they left ancestral fossils in the Paleozoic rocks, have often been spoken of as examples of the persistence of species. There are great numbers of other geological examples of this sort. But all these are but parvenues, or mushroom upstarts, so far as numbers of ancestral generations are concerned, when compared with these most ancient bacteria and protozoa mentioned above. Surely these examples ought to be a final refutation of the unscientific myth that all the kinds of life tend to become transformed or transmuted into other kinds of life during the course of long periods of time. Everyone who is capable of appreciating evidence must acknowledge that these forms present a most powerful argument against any universal tendency toward transformism or evolution among living things.

V

Some fifty years ago, O. Bütschli made a mixture of things which seemed to show movements and behavior somewhat like the behavior of living things. Olive oil was ground up in a mortar with certain salts which are greedy for water, such as potassium chloride. When water was added, the salt began to unite with some water through the film of oil, with a resulting fuss and commotion which took on the appearance of minute bodies of protoplasm sending out pseudopodia. Under

a magnifying glass it looked as if the mass of stuff had become alive, so much did it resemble the movements of amoebae and other protozoans. And in 1914, at an entertainment under the auspices of the Royal Society of Great Britain, these wriggling drops of oil were placed on a slide and their movements were shown on a screen by means of a lantern, much to the entertainment of the assembled scientists.

Time and again similar imitations of protozoan life have been shown to the world, sometimes as clever tricks, sometimes by self-deceived men who actually thought they had at long last bridged the gulf between the living and the not living. But all statements which indicate that this gulf has been crossed by artificial means in modern times and under scientific observation are due either to self-deception or to sheer charlatanry.

VI

It may be worth while to list here some things which characterize living things which are utterly unknown with regard to any substances or things which are not alive.

1. Metabolism. Living things take in food, assimilate it, and when they have used it in their vital processes, they throw off or excrete the waste products produced by these vital processes. Crystals or other not-living things may grow by addition to their outsides, but they never do anything at all that resembles metabolism.

2. Reproduction. Nothing at all that resembles reproduction takes place in not-living things.

3. Living things react to external stimuli in ways conducive to the welfare of the organism.

Of course there are other forms of vital behavior which might be mentioned, but these are sufficient for our present purpose.

The amoeba may be taken to represent the lowest form of animal life. But even this minute speck of jellylike life

seems to show something like semi-intelligent action. For when a large amoeba has managed to swallow a smaller one, and the latter, by struggling, finally gets away, the captor will chase it, and if possible catch it again. Does not this show a degree of purpose or will? As Jennings remarks of such action, "If amoeba were the size of a dog, instead of being microscopic, no one would deny to its actions the name of intelligence."

The other single-celled animals exhibit similar behavior. If food is placed behind them, they will make a line for it, even though the direction is contrary to that in which they were previously moving. Modern biologists offer to "explain" all such actions as being due to "reflexes;" but the latter is merely a name, and a question-begging name at that. It is important to remember that we do not explain a form of action by naming it.

All the higher forms of life begin their careers in the form of minute specks called eggs, which, if we found them as independent creatures, we would class with the amoeba. Like the amoeba also, these eggs (under the proper conditions) reproduce themselves by dividing into two cells, then into four, then eight. In the case of the amoeba the two daughter cells which result from division *stay apart,* each living a henceforth independent life. But in the case of the higher animal egg, when division takes place, the two cells *stick together,* and the process of repeated division and multiplication is kept up, all still sticking together and co-ordinating with one another, until a mature animal is formed like the original animal from which the egg came.

This process of an egg growing into a mature individual will be studied in more detail in the next chapter. But here it is important to note that there has never been any rational explanation of the amazing fact that, when these daughter cells of the egg have multiplied to a certain stage, the individual cells begin to *specialize;* that is, they begin to become

unlike one another, some being set apart for one particular kind of physiological work, and some for another. Elaborate theories have been invented to explain this behavior, but the entire process of embryonic development seems quite beyond any rational explanation.

We have the other question-begging word "heredity;" but we still do not know why certain cells in the developing embryo are very early set apart for some particular function, or for building certain organs, and thereafter are never diverted from this line of duty to do a different work or produce a different kind of structure. In the young embryo certain structures arise at certain predestined times and in specified places to perform certain specified tasks, and only there and out of those cells alone.

In regard to *why* all this should be so, no materialistic explanation is sufficient. To me all this is visible proof of the all-pervading care of the order-loving Creator, whose tender mercies are still extended to all His works. It is still true, as was expressed by an eminent authority a number of years ago:

"We still do not know why a certain cell becomes a gland cell, another a gangleon cell; why one cell gives rise to smooth muscle fiber, while a neighbor forms voluntary muscle. . . . It is daily becoming more apparent that epigenesis with the three layers of the germ furnishes no explanation of developmental phenomena."[15]

VII

But an important principle emerges here when we find that cells which are once set apart for a particular kind of work never change off and develop into a kind of cell with different functions. Pathologic degeneration brings in confusion, and cells become perverted in their behavior; but

[15] *Nature*, May 23, 1901, p. 76.

normally *they never change over into cells with distinctly different functions.* "After its kind" seems to apply to cells in the developing embryo as well as to mature animals and plants in their reproduction.

The following testimony is sufficient to confirm this idea:

"In accordance with this law [of differentiation] we encounter no instances, either in normal or pathological development, of the transformation of a cell of one kind of tissue into a cell of another kind of tissue; and further we encounter no instance of a differentiated cell being transformed back into an undifferentiated cell of the embryonic type with varied potentialities."[16]

Consider for instance how grafts maintain their ancestral characters, and are not affected by their new environment. These transplanted cells reproduce only "after their kind," and not after the kind of stock onto which they have been grafted. If you graft a red Delicious apple onto a scrub stock, you expect to get good Delicious apples from the tree when it matures.

The same principle holds true in the case of animals. The following is from Edwin Grant Conklin:

"Harrison cut in two young tadpoles of two 'species' of frog, *Rana sylvatica* and *Rana palustris*, and spliced the anterior half of one to the posterior half of the other. These frogs and their tadpoles differ in color as well as in other respects, *R. sylvatica* being more deeply pigmented than *R. palustris*. In the grafted tadpoles each half preserved its own peculiarities, even up to the adult condition."[17]

Conklin mentions some further experiments with mammals, and gives the following:

"Finally Castle and Phillips furnished the most conclusive demonstration that the hereditary characteristics of the transplanted ova are in no way changed by the foster mother. They removed the ovary from a pure black guinea pig and put it in the place

[16] Charles Sedgwick Minot, in *Science*, March 29, 1901, p. 490.
[17] Edwin Grant Conklin, "Heredity and Environment," pp. 245, 246. Princeton University Press, 1930.

of the ovary of a pure white animal. After recovery from the operation this white female with the 'black' ovary was bred to a pure white male. Three litters of offspring from these parents were all pure black. Although both parents were pure white, all the offspring of the F_1 generation were black, because they came from 'black' eggs, and black is dominant over white. The fact that these 'black' eggs developed in the body of a white female did not in the least change their hereditary constitution."[18]

Since these experiments were performed, many more along the same line have abundantly confirmed this principle, that the cells of grafts, no matter what they are or where they are placed, if they can survive in their new environment, keep on developing according to their heredity, and not according to their environment.

VIII

Such facts tend to make it appear that heredity is everything, and that environment is of little account. True, they do prove, what is confirmed by a profusion of various kinds of other facts, that the effects of environment are not accumulated and passed along to the next generation, as Lamarck and Darwin used to think. In other words, "acquired characters" are not transmitted.

If the cells of a sea-urchin embryo are separated (by shaking or in some other way) when they have reached the four-celled stage, each of these separate cells, which was going to develop only into a *part* of a new animal, will now abandon this "plan," and each will develop into a perfect though smaller embryo. Further particulars along this line will be given in the next chapter, but the lesson is needed here; namely, that mere heredity is not sufficient to account for these facts.

But the late J. S. Haldane (to be distinguished from his

[18] Id., pp. 246, 247.

son, J. B. S. Haldane) denied emphatically any such mechanical view of heredity:

"The mechanistic theory of heredity is not merely unproven, it is impossible. It involves such absurdities that no intelligent person who has thoroughly realized its meaning and implications can continue to hold it."[19]

In my own "History of Some Scientific Blunders" (pp. 72, 75), I pointed out that the modern theory of the genes as the carirers of heredity is just a revived and somewhat transcendental form of the preformation theory of Charles Bonnet, which was supposed to have been dead and buried long ago. It seems that this theory is still with us. But I am glad to note that MacBride[20] has also identified the gene theory with the theory of preformation. One is reminded of P. W. Bridgman's thoughtful words, written about certain tendencies in physics, but just as appropriate here in biology:

"I believe many will discover in themselves a longing for mechanical explanation which has all the tenacity of original sin."[21]

But here is a good statement about the preformation theory from very eminent modern authorities:

"It is impossible to imagine any theory of preformation, however elastic, which will explain the fact that an egg normally develops into a single embryo, and yet can be made to give rise to two or four whole embryos."[22]

Professor E. W. MacBride, of London, is one of the best-known biologists of our time. For many years he has expressed his complete disbelief in the reality of the genes as the physical carriers of heredity. This is not because nobody has ever seen a gene, but because of the logical meaning and

[19] J. S. Haldane, "Mechanism, Life, and Personality," p. 58. New York: E. P. Dutton & Company, 1923.
[20] See "Evolution in the Light of Modern Knowledge," p. 238. London: Blackie & Son, Ltd., 1925.
[21] P. W. Bridgman, "The Logic of Modern Physics," p. 47. New York: The Macmillan Company, 1927.
[22] J. S. Huxley and G. R. DeBeer, "Elements of Experimental Embryology," p. 7. Cambridge University Press, 1934.

implications of the theory. I might give whole pages of his arguments along this line, but a few quotations will suffice.

Here is one in which he pays his compliments to Professor J. B. S. Haldane:

"I envy Mr. Haldane his childlike faith in the Mendelian genes. Mendelian genes are abstractions which exist in the mind of the geneticist, *and nowhere else.* Mr. Haldane, who is a most able mathematician, knows very well that by properly choosing your genes any conceivable difference between two races or mutations can be made to fit. As an old Oxford 'greats' man, he is also well aware that a proof of the validity of the Mendelian scheme attained in this way is not worth the paper it is written on."[23]

In a recent paper MacBride tells us that W. L. Johannsen, who is famous as the discoverer of "pure lines," has declared that he is sorry that he ever coined the word "gene," because of the use to which the theory has since been put. And MacBride himself has the following vigorous views on the subject:

"Amongst the foremost zoologists in Great Britain—those who have really the right to speak on the specific problem—there is a widespread scorn for the whole 'gene' theory."[24]

All this, of course, has nothing whatever to do with the proved results of Mendelism and the Mendelian laws of heredity. These have now been so well worked out, and in so many various departments of both zoology and botany, that they need no evidence of mine to support them. So far as we know, all the factors or characters which are passed along in heredity "Mendelize," or are passed along separately, so that under the proper conditions, a descendant may receive one of these factors and not another. But the facts along this line are now so well known to the average reader, and are given in detail in so many textbooks, that I need not repeat them here.

[23] *Nature*, November 2, 1929, p. 690.
[24] Id., November 27, 1937, p. 932.

IX

But let us pause here a moment to get our bearings. Let us see just where we are in this matter of the genes as the mechanical carriers of heredity. Perhaps we are on a wrong road entirely.

We know that every individual among the higher forms of life has come about by the union of elements from two parents, a male and a female. But it is only a minute piece (the sperm) of the male which actually united with a minute piece (the ovum) of the female.

Since the ribbonlike chromosomes (which can be seen) appear to mingle and lose their identity, it is *inferred* that some still smaller units, the genes, must be the actual entities which carry the hereditary factors or tendencies, and that thus these genes are the things of vital importance.

But suppose we could actually see the genes; wouldn't we think that there must be some special *parts* of them that actually do the business? And if we could see them, wouldn't we still want to go on and find the *parts of the parts* of the genes as the things of crucial importance? It seems to me that there is no stopping on this road, for after all it is a road of sheer mechanism and materialism. And all this is to forget that the things with which we are dealing *are alive,* and will not necessarily act like bricks or stones or mere machines.

Moreover, mechanism or materialism completely leaves God out of the picture. And why should we continue to ignore the living and active Manager of the universe, whenever we come up against facts and phenomena which we cannot explain on purely mechanical principles?

For, after all, there are very many processes in God's universe which do *not* depend upon material things or entities for their accomplishment.

Let us consider the way in which property is transmitted. There may be a lesson in regard to heredity in the way in

which we inherit property, stocks or bonds, or even a family name. This name is certainly not a material entity.

Suppose I have considerable property, say a million dollars, and I want to leave it to my son. I make a will to that effect. Of course, this will is a material entity, and a certain number of centuries ago men used clay tablets, which were still more like material things. But if I am about to die, and I make a declaration in the presence of two or three friends, the courts will accept such a declaration on their testimony. The court will accept the testimony of even one such witness, if it believes him. And this is no material entity which becomes the actual means for the passing of my property over to my son.

Or how is the sovereignty of the British Empire transmitted? Some kings have made wills, but the transmission of even an empire is not dependent upon a will. The law of the land will settle the matter. This law of the British Empire has a long antecedent history, and it is this antecedent history, with all that accompanies it, which determines whether a certain little boy is to be king of England, and a somewhat similar antecedent history determines whether a certain other little boy is to be emperor of Japan.

So there are very many and very important matters in our world which are decided by considerations quite different from material carriers or entities. Why may it not be that the Creator has planned somewhat similarly in the matter of the transmission of what we call hereditary factors? Let us remember again the words of P. W. Bridgman, addressed to physicists, but exceedingly important for biologists:

"I believe many will discover in themselves a longing for mechanical explanation which has all the tenacity of original sin. The discovery of such a desire need not occasion any particular alarm, because it is easy to see how the demand for this sort of explanation has had its origin in the enormous preponderance of the mechanical in our physical [and biological] experience. But

nevertheless, just as the old monks struggled to subdue the flesh, so must the physicist [and also the biologist] struggle to subdue this sometimes nearly irresistible, but perfectly unjustifiable desire."[25]

X

I have no disposition to deny the real existence of something which is the medium for passing the biological characters of the parents over to the next generation. And perhaps we may as well call them "genes" as anything else. But when we have admitted the reality of such "carriers" of heredity, we still need to face the problem of whether we are to look upon these genes (or whatever we are to call them) in the spirit of genuine *epigenesis* or of *preformation*. For it must be the one or the other. And I for one believe in genuine epigenesis. I believe that the new being formed by the union of the sperm and the ovum, or the zygote, shows a genuine development of its own, and that its characters were not in any sense preformed in the cells from which it arose. It is a new being, though its initiation was made by living particles of each of the parents, and they twain are responsible for the new life; yet its development is its own, and it is a denial of all this to look for material "carriers" like genes for every separate character which it finally develops.

For some of its most characteristic developments may come only after many years. Whether a man's head is to become bald at middle age or not at all, even in old age, is all in heredity. Hence there must be a gene or a number of them for baldness or its opposite. But where was the gene all these many years while the man was getting old? Do the genes remain quiescent thus for long periods? It seems absurd that they can be efficient in this style, like a delayed-action bomb, going off only after many years have elapsed.

[25] P. W. Bridgman. "The Logic of Modern Physics." p. 47. New York: The Macmillan Company, 1927.

It seems to me that Theodosius Dobzhansky catches a glimpse of these ideas when he speaks of "chemical substances of the hormone type"[26] which appear *ahead of time* in preparation for some adult characteristics, such as the color of a man's beard or his ancestral height, which appear only after perhaps twenty years of life. Thousands of characters of the developing organism appear only at predestined times and in specific places in or on the organism; and the requisite "chemical substances of the hormone type" are always developed at the proper time as a *preparation* for these events. Are we to suppose that material carriers of ultramicroscopic size, thousands of distinct kinds of them, are actually responsible for all this *timed preparation* for events years or even decades ahead? I don't believe a word of it. Far better let us say that the great God of heaven looks after all these things, and His fiat control is the only rational explanation. His "Let there be" is a more rational explanation than all the materialistic preformation schemes ever invented. And the modern gene theory is only a modern transcendental type of preformation theory after all.

Dobzhansky almost admits as much. After speaking of chemical precursors of the visible traits which later appear in the organism, he says:

"The disappointing feature of this work is that to date it has failed to give a clear insight into the gene action proper."[27]

And I venture to say that no clearer insight into gene action will ever be attained by any theory which looks to material "carriers" of heredity in this way.

J. P. Lotsy, the Holland botanist, has the true idea when he says that the ultimate reason for assigning genes as the carriers of heredity "is the creed that the smallest particles of

[26] Theodosius Dobzhansky. "Genetics and the Origin of Species," p. 10. New York: Columbia University Press, 1937.
[27] Ibid.

living matter must necessarily be living themselves." This he says "is a mere creed," and incapable of proof. And he points out that we can have heat in a chemical mixture without each separate component of the mixture being hot to begin with; and similarly life does not demand that the smallest components of living cells should themselves be alive.[28]

Some clever critic may pick flaws with Lotsy's illustration, but, it seems to me, there must be some final unit of the cell, whether of the somatic cell or the fertilized ovum makes no difference, some ultimate component of the cell, which is not alive, but a mere chemical element. And it is wrong philosophy and wrong religion to be always assigning *all* that ultimately comes out of a living combination and manipulation of these elements to the chemical elements themselves. Such a theory is too much like worshiping and serving the creature more than the Creator. Rom. 1:25.

XI

If now it is safe to assume that the reader has succeeded in subduing the flesh in this matter of a desire for a material explanation of things which are entirely and probably forever beyond the possibility of our actual sight, we can discard the genes and the larger part of the enormous mass of literature which has been built up around them. With Tennyson, we can still believe where we cannot prove, and we also have many actual facts that we can prove, which show the laws or the methods by which God carries on this phase of His universe. The secret things are beyond us, but those which are actually revealed belong to us and to our children. And there is enough which has actually been revealed about the things of nature to keep us busy for a long, long time.

This chapter has been dealing with the cells and the more

[28] See J. P. Lotsy, "Evolution by Means of Hybridization," pp. 59, 60. The Hague: Martinus Nijhoff, 1916.

minute aspects of living things. We have seen that there is no glimmer of scientific evidence that the passage from the not living to the living has ever been effected in modern times; and from this the conclusion is inevitable that there must have been an original creation of living things at some time or times in the long ago.

But is there any justification for the idea that all life must have begun as single cells, and must by natural development have grown into more complex forms? I am afraid that this idea is also like the desire for a mechanical explanation which we have studied above, and seems to cling to us with "all the tenacity of original sin."

Austin H. Clark, of the Smithsonian Institution, is a very eminent biologist; and he has subjected this idea to close critical study. And he does not like this idea. He states the ordinary evolutionary assumptions thus:

"Since all animals begin as a single cell, and since many animals are known whose entire body consists of a single cell, therefore these single-celled animals must be the most primitive, and all other animals must have descended from them. So we are tempted to construct an evolutionary line from the single-celled animals to those whose body is most complex in terms of cells, and then to arrange all animal types as best we may along this line."[29]

He means that this is the way we are inclined to reason; but he thinks that this is a wrong method of reasoning. He says:

"It is almost invariably assumed that the animals with bodies composed of a single cell represent the primitive animals from which all others are derived. They are commonly supposed to have preceded all other animal types in their appearance. There is not the slightest basis for this assumption beyond the circumstance that in arithmetic—which is not zoology—the number one precedes the other numbers."[30]

[29] Austin H. Clark, "The New Evolution," p. 165. Baltimore: The Williams Wilkins Company, 1930.
[30] Id., pp. 235, 236.

And again:

"There is no logic in the assumption that the earliest animals were of the single-celled or protozoan type. All of the single-celled animals that we know are quite as highly specialized as are any other animals, though they are specialized in a wholly different way."[31]

One of the things which Clark has in mind is the fact that in the very "lowest" Cambrian beds, that is, in the very "earliest" of the geological deposits, all of the phyla except one, the vertebrates, are represented. This means that, with the world to pick from, and with all the lower orders of life to arrange as they may, the geologists have not been able to start off the animals in a long single file, but all the lower kinds seem to *start off together at the very beginning.* This has long been a sore perplexity to evolutionary geologists, but there seems no way to change the situation.

We need not pause here to consider how Clark tries to have all the phyla start off together, and still call it a scheme of "evolution." All I am after in this connection is the statement that there is "no logic" in the assumption that the first animals must have been protozoans. This much at least is in full harmony with the record in Genesis.

XII

Some of the older ones among my readers will remember how completely the mechanistic view of nature prevailed forty and fifty years ago, or during the last few decades of the nineteenth century. Darwinism had triumphed, and with it triumphed Lyell's geology and the repudiation of the Biblical view of the world. But this period was characterized by a complete stagnation of thought. As Whitehead so well expresses the situation:

[31] Id., p. 193.

"Then, almost suddenly, a pause occurred; and in its last twenty years the century closed with one of the dullest stages of thought since the time of the First Crusade."[32]

During the period of its popularity, the mechanistic scheme of nature made thought and purpose just by-products of physical and chemical processes. It was this mechanistic view of nature which Tennyson portrayed so vividly, but hardly knew how to combat in the words:

" 'The stars,' she whispers, 'blindly run.' "

Tennyson tried to believe where he could not prove; but for the great majority of those who witnessed the overwhelming triumph of materialism, it seemed like an end of all that Christianity had pictured as worth while. It was openly taught on almost every side that the brain secretes thought just as the liver secretes bile; and this idea was flaunted before the panic-stricken bands of Christians who wished to be acquainted with nature and nature's ways, as final proof that there is no God and no future life.

But many are the evidences that a change has come. Many biologists are still trying to explain vital phenomena in terms of physics and chemistry; but there are many who declare that there will always be something left over in vital processes which cannot thus be equated or explained away.

Yes, life is more than a mechanism, more than a complicated machine. But we don't have to postulate an "entelechy" to believe that. Nor do we have to say that the mind or the soul is inherently immortal and can exist apart from the body, to say that in human beings we see a special manifestation of the life of God which He has made capable of discerning moral right and wrong, and capable of holding communion with its Maker.

Science, in its stumbling, incomplete way, is learning now, after many mistakes, that life cannot be measured or

[32] A. N. Whitehead, "Science and the Modern World," p. 148. New York: The Macmillan Company, 1925.

evaluated by the microscope or the test tube. But it is something that modern biology has at last discovered this great truth, for it may help many to recognize in these researches that the great Creator is still ever active in maintaining the most minute parts of the universe which He has created, both the living and the not living. But the very fact that by no manipulation or ingenuity of technique can we make alive anything which does not already have life, ought to go a long way to convince the modern world that only by the impartation of the life of God can those who are dead in trespasses and sins ever hope to enjoy eternal life, that life which measures with the life of God throughout the endless vistas of the coming eternity.

But with this we should bring to a close this chapter which deals more specifically with the beginnings of plant and animal life. Certain facts have emerged by our study. These may be summarized as follows:

1. Spontaneous generation is a myth. Nothing like a change from the not living into a living organism, either one celled or many celled, has ever been observed by modern science. From this the conclusion is inevitable that the first living things must have been created by God in some manner not at all like the processes now prevailing by which these living things are kept alive and enabled to reproduce themselves from generation to generation.

2. There is "no logic" in supposing that the simple one-celled forms of life must have preceded the kinds of many cells. Even modern geology has to admit that all the phyla or major groups of animals are of equal antiquity, so far as science can ascertain.

3. We see plants and animals around us reproducing "after their kind." That is, we see them giving origin to others like themselves. The common idea among biologists is that there must be some material carriers of heredity to effect this transmission, and these carriers have been named

genes. But there is no proof that such carriers actually exist. And in biology as in physics we are cautioned against the seeming need of a mechanical explanation of heredity, for this desire for a mechanical explanation tends to cling to us with "all the tenacity of original sin."

Accordingly, we may conclude that this power to reproduce other plants or other animals like themselves is simply a modern expression of that fiat of the Creator which is recorded in the Genesis account: "Let the earth bring forth . . . after his kind."

God's creative fiat has no limits of space; it is effective at any distance. But it is also effective for any length of time; it has no time limits. And a decree made at this morning of the world is still just as effective (with or without a material medium) for the production of new plants and animals as it was in the very first generation of the kinds originally created.

Of course, it may be too much to expect the paganized textbooks of the "secular" high schools and universities to recognize these important truths about action at a distance and the other phenomena which are wholly inexplicable without invoking the direct working of God; but how can Christian teachers complacently think they have done their duty to their students without repeatedly impressing these profound truths in all their classwork? For the recognition of the obvious facts in all these matters cannot fail to have a sobering and uplifting influence upon young and old alike, while their nonrecognition or rejection will surely tend to ripen the tares for the fires of destruction so soon to sweep over our world.

CHAPTER FIVE

How a New Animal Is Made

I

ONLY a few years ago, Professor Maurice Caullery, of the University of Paris, gave the Joseph Leidy Memorial Lecture before the University of Pennsylvania. In this lecture he started out with a summary of the situation in biology that prevailed at that time, 1933. I shall reproduce some of his opening remarks, as follows:

"Most of the theories of general biology which were in great favor and seemed to be the definitive expression of truth at the time of our youth are now in the background; so, for instance, the idea of phylogenic trees and the law of recapitulation, which seemed then the center of every evolutionary consideration. We could hardly find among the teachings or original works of today any notable discussion of these topics. Many hypotheses which seemed evident are now doubtful or even completely rejected. The progress of knowledge has deeply modified the relations of things as they appeared; but, as in many human activities, progress is not alone responsible for that; for there are, even in habits of thinking, fashions which lead the minds of workers in certain directions. Forty years ago we were in the age of phylogeny. I would be inclined to say that we are now in the age of chromosomes."[1]

As the so-called "law" of recapitulation, or the theory that the individual in its development from the egg passes through

[1] Maurice Caullery, "Present Theory of Evolution and the Problem of Adaptation," p. 1. Philadelphia: University of Pennsylvania, 1933.

or repeats stages which the species passed through in its long racial evolution, though "now in the background," seemed the center of biological interest a generation ago, it may be of importance for us to study the actual facts about embryology, or the development of the individual prior to birth.

Two technical words need to be explained here. "Ontogeny" is the history of individual development, beginning with the egg; "phylogeny," on the other hand, is the name applied to the theoretical history of the race in its evolutionary development from the small to the large, or from the simply organized to the more completely organized forms. And the so-called law of recapitulation used often to be stated in the terse way: "ontogeny repeats phylogeny," or the individual climbs his own family tree.*

Man, for instance, according to the theory, passes through stages in his embryonic development which are similar to the more permanent forms among the lower animals. This is what is behind all the discussion about a human embryo's showing traces of gill slits like a fish, or having a tail, or shedding a coat of long hair (the lanugo) just before birth. Even after birth his animal heritage still stays with him, so the advocates of the theory declare, for in his infantile stage he is a little animal, then he goes through a savage or barbarian stage, after which he becomes capable of civilization. This form of the theory is still taught in most normal schools for the training of teachers.

The cruder and more patently false forms of this recapitulation theory are now given the soft pedal, but the general

* In the early days of the evolution theory, it became the fashion to construct phylogenetic trees for almost every group of the plant and animal kingdoms. So much was this overdone that it provoked a reaction: and Conklin recalls a remark made by Professor Watase, of the Imperial University of Tokyo, while doing some research work at the Marine Biological Laboratory at Woods Hole, Massachusetts: "I am through with this whole phylogeny business." William Bateson also spoke of his disgust with the mania for constructing imaginary phylogenies for all the animals. It is a pity that more moderns have not imitated these two eminent men.

idea is so vital a part of the entire scheme of organic evolution in its opposition to the doctrine of creation, that we do well to study the subject even in some detail.

II

A century or more ago, when microscopes were poor and imaginations were luxuriant and were invoked to supply what could not be seen, there was a long controversy for and against the preformation theory, or the theory that a miniature of the mature individual exists ready-made in either the ovum or the sperm. I have devoted a chapter to this subject in a former work,[2] and will have more to say about it later in the present chapter.

Poor microscopes and careless observation, together with a reckless use of the imagination, were responsible for wild and inaccurate statements by such men as Oken and Meckel a century or more ago, that the higher animals pass through embryonic stages like the mature forms of other animals below them in the scale. This view was not then called a process of recapitulation, for no coherent theory of evolution was then formulated. But these alleged facts of embryology were taught as wonderful curiosities, and were made use of by the mystical, pantheistic theories then current which sought to link all forms of life together into a fancied oneness. These pantheistic theories were known as "natural philosophy," though in some respects they were more like theosophy than real science.

Karl von Baer (1792-1876), who may be called the founder of embryology, has even been spoken of as teaching the recapitulation theory. The latter is inaccurate, as Von Baer was one of the most severe critics of this theory. He

[2] See "A History of Some Scientific Blunders," pp. 67-75. New York: Fleming H. Revell, 1930.

pointed out many details in which the young embryo differs radically from any adult form, and maintained:

"No lower animals exist that really resemble the embryonic stages of the higher animals, but, on the other hand, the embryo of a higher animal and that of a lower animal resemble one another more closely than do the fully developed animals. The tissues of the embryo are less differentiated than those of the [mature] animal itself, and are therefore more like the tissues in lower animals; but a fish embryo is from the very outset, and always remains, a fish, just as every vertebrate animal's embryo is from the beginning a vertebrate animal."[3]

This was a full century ago. Accordingly, if Von Baer had been heeded, the scientific world need not have gone chasing the evolutionary will-o'-the-wisp under the misleading teachings of Haeckel and the evangelists of evolution of the last quarter of the nineteenth century.

Louis Agassiz (1807-1873) had been a student under Cuvier (1769-1832), the founder of comparative anatomy. He became an admirer of the comparative embryology of Von Baer, his contemporary. But he went these two men one better, for he introduced the method of comparing also the geological series, as shown by the fossils in the geological "ages" from the Cambrian onward. So now under Agassiz we have *three* series compared and studied in parallel: the classification series from the amoeba to man, the embryonic series from the ovum to maturity, and the geological series from the earliest known fossils up to the most modern.

I give a statement of the case from Joseph Le Conte, a pupil of Agassiz and an ardent evolutionist:

"The one grand idea underlying Agassiz's whole lifework was the essential identity of the three series, and therefore the light which they must shed on one another. . . . In other words, during

[3] Erik Nordenskiold, "The History of Biology," p. 365. New York: The Tudor Press, 1935.

his whole life, Agassiz insisted that the laws of embryonic development (ontogeny) are also the laws of geological succession (phylogeny). Surely this is the foundation, the only solid foundation, of a true theory of evolution."[4]

Thus with what he regarded as models or types under which all nature is constructed, and believing that embryology furnishes the key even to the geological succession during the successive "ages," Agassiz taught the world how to straighten out any difficulties which geologists might encounter among the fossils in the field, by this simple method of making the geological order fit the embryonic, just as the legendary Greek Procrustes made his captives always fit his iron bed. Since the embryonic series is fixed and cannot be doctored or changed, while the taxonomic, or classification, series is a purely artificial affair and can be arranged in any way one wishes, and as the geological series is also very accommodating, and, by the selection of strata from here and there over the globe, can with a little courage and much ingenuity also be brought into line, Agassiz was able to stand his three precious series side by side and call upon an amazed and credulous world to see how remarkably they resembled one another.

And then Darwin and Haeckel and all the rest went even Agassiz one better, and made this threefold comparison the climax of all their arguments for evolution, the one unanswerable (?) argument, which usually left its opponent speechless with a nameless stupefaction. This method of reasoning was in reality the way in which the evolution theory captured the imagination and the sober sense of the entire world.

It was in 1857 that Agassiz published his book, "Essay on Classification," which thus, two years before Darwin's

[4] Joseph Le Conte, "Evolution and Its Relation to Religious Thought," p. 43. New York: D. Appleton & Company, 1888.

"Origin of Species" (1859), laid what Le Conte was pleased to call "the only solid foundation of a true theory of evolution."

Percy E. Davidson, in a monograph on the recapitulation theory, tells us how Agassiz used his key of embryology to unlock the difficulties of geology and of taxonomic classification.

"As his interest broadened to include the systematic classification of the whole animal world, Agassiz relied more and more upon the facts of embryology to make good the deficiencies of fossil remains, and to prevent the confusion, inevitable, as he believed, from an examination of anatomical differences alone. In 1857 he wrote, 'I satisfied myself long ago that embryology furnishes the most trustworthy standard to determine the relative rank among animals.' "[5]

In the final form of this system, Agassiz added a fourth series to the other three—namely, the geographical distribution of animals, which is also a purely artificial affair. And yet, with *only one* real or actual series and three purely artificial, Agassiz could hold up his hands in pious admiration and say, "The same series everywhere!"[6] And in what was nothing short of blasphemy, he piously attributed the whole scheme to the planning of the Creator.

We shall have occasion presently to give more of the history of these theories, and shall see how these artificial series, particularly the geological and the classification series, the most important of all for the evolution theory, have been adjusted or manipulated so as to make the theory more plausible.

But it will be in order now to consider some of the actual facts of embryology as now known, for they are among the most interesting and instructive in all nature.

[5] Percy E. Davidson, "The Recapitulation Theory and Human Infancy," p. 10. New York: Teachers College, Columbia University, 1914.
[6] Ibid.

III

After the union of the sperm and the egg in the process of fertilization, the united cell proceeds to divide successively into an increasing number of cells, with little or no increase in volume. This process is known as the cell *cleavage*. During cleavage the multiplying cells each become smaller and smaller. The total mass remains the same, but the different cells become more and more differentiated from one another.

Thus far all animals begin their embryonic development alike. Most also continue to act alike until they form the hollow, ball-shaped mass known as the *blastula,* or even until this has grown into the *gastrula* stage, with its double layer of cells.

From this point onward the different kinds of animals embryos grow more and more unlike one another. This process is in reality much like the building of houses. At first the foundations of several houses might be essentially alike, but as the building progresses, the structures become more and more different.

There is this difference, however: In the building of different kinds of houses, we know that there is an architectural mind directing the work, while in the case of the developing embryos, most modern scientists would have us believe that all the work goes on with no mind directing it, but as the result of inherent properties in the constituents of the original cells. I don't believe this materialistic theory. For one reason, no microscope has ever been able to detect much difference in the nuclei of the component cells of any one animal, and very little difference has been found between the germ cells of different animals, except differences in the chromosomes of the nuclei; and I refuse to believe that any embryo can develop into a mature animal without the ever-present care of the God of nature. The entelechy which some have postulated to superintend these and other vital

processes is only a clumsy name for God. I prefer to spell it J-e-h-o-v-a-h.

Difficulties in the way of any firsthand study of this minute speck of developing life are very great. Of course, one cannot speak of *watching* a human embryo in its development. In all medical history the number of fortunate (or unfortunate) cases that have been reliably reported to science may almost be counted on the fingers of one hand—I mean those concerning the human embryo in its very early stages.

In the case of rabbits or guinea pigs, too, the number of specimens we can examine is limited by the number of mothers which we are willing to sacrifice in the interests of science. Even so, every specimen we examine is stopped right there, and for other stages in growth, either earlier or later, we must have still other specimens. And then the continuous story must be pieced together.

The eggs of the chick and of other lower forms of life are attached to yolk sacs from which they derive their nourishment, and thus can be studied more easily. But all are microscopic, and require special techniques in order to be effectually studied. In the case of the egg of the chick, the usual method is to select about twenty-one specimens and set them all incubating at the same time, and then open one each day. Even then, however, the specimens must be embedded in some harder material, so as to provide for making very thin slices in a microtome, under which plan a series of these thin slices or sections is made available for examination under the microscope.

Taking all things together, the growth of embryological knowledge has been a slow and toilsome process, and even now is not by any means complete, though a considerable body of facts and principles has been accumulated.

The mere outline facts in the development after the gastrula stage of such an animal as the frog, are impressive enough, for this development seems to be carried on by some

superintending Mind, in regard to both the general plan and the actual execution of that plan.

The foundation for the digestive tract is laid by the infolding of the outer layer of what was the hollow ball of the blastula stage. The tissues which have to do with digestion, including the pancreas and the liver, develop later from this, though the muscular and connective tissues involved in this region develop otherwise.

At the same time the nervous system begins to form from the outer layer, with a prominent enlargement at the anterior end, the beginning of the brain. Since the brain is the powerhouse of the body, and since the young creature is a distinct individual fending for itself, so far as its nerve and blood supply are concerned, the brain must be much larger at this stage proportionately than it is later.

The rudiments of the backbone appear as the notochord, though actual cartilage and bone do not appear until much later. At the same time the first elements of the heart and a circulatory system begin to show themselves.

The rudimentary organs of sense begin to form. Two bulges push out from the brain, and at their ends saucerlike depressions appear, these becoming the retinae of the two eyes. From the outer germ layer opposite each of these bulges from the brain appears an ingrowing part which forms the lens. The eyeball, optic nerve, etc., are much later developments. But the retina and the lens are obviously *provisions beforehand for what is going to appear later.* In reality, many such anticipations of what will be needed subsequently occur in various parts and at various stages in the development of the embryo, but the retina and the lens of the eye may serve as examples.

Meantime the body of the young creature is elongating, a caudal fin (tail) is developed, blood and muscles begin to function, and the tadpole is able to work its way out of its enveloping egg jelly, and swims away as a free creature.

During all this time the little creature has been living entirely upon the food supply stored up in the egg. It has absorbed considerable water, and this accounts for whatever increase in size is noticeable, but this increase is not great.

The tadpole is scarcely any larger than the egg from which it has developed.

At this time it has no mouth and no anus. But it has developed two sucking disks near where the mouth will later appear, and by means of these disks it fastens itself to a piece of grass, and waits until its mouth and other organs are ready for use.

These sucking disks are temporary organs, and are present during only a short period of the creature's life. They appear when they are needed, but when they are no longer needed, they are discarded. Similarly the tail and the gills become resorbed, and completely disappear when the tadpole is ready to become a frog, after which it lives the life of an aquatic land animal, breathing air instead of absorbing its oxygen from the water.

The development of the embryo of the chick proceeds at first much the same as does that of the egg of the frog. Of course, there is a much larger amount of stored-up food, in the form of the yolk of the egg; and the nucleus in its cleavage divisions forms a plate of cells instead of a sphere, this plate being at the top of the yolk. For the entire egg is regarded as a single cell, its great bulk being due to the large amount of stored-up food which the embryo draws upon during its development.

To avail itself of this food supply the little creature develops various temporary structures: a membrane called the *amnion,* to completely enclose itself inside the shell; a *yolk sac;* an *allantois,* a sausagelike sac on its anterior end which takes care of the supply of oxygen and the elimination of wastes for a while, or until the embryo can attend to these functions of metabolism for itself. But all these tem-

porary or embryonic structures, the amnion, yolk sac, and the allantois, are discarded when the chick hatches.

The egg of the chick is protected by its shell, but the egg of a mammal is much better protected by being within the uterus of the mother, where it undergoes its embryonic development. The mammalian egg contains little or no yolk. For its food supply it sends out a highly important set of tissues called collectively the chorionic villi, which embed themselves in the walls of the uterus, thus forming the *placenta.* Through this the embryo, like a real parasite, draws its entire food supply and its oxygen and discards the wastes of metabolism. The blood of the mother never actually penetrates the membranes which separate the embryo from the maternal blood system; all exchange is by diffusion. The young creature lives its own life, the mother being only a sort of incubator and nurse for it, supplying it with food and oxygen, and eliminating its waste products of metabolism. The two blood streams never actually commingle, unless there are disease lesions formed.

But here again there are many structures which are only temporary. They are like the scaffolding of a house, which is discarded when it is no longer needed. And yet some of these temporary structures have been pointed to in astonishment by evolutionists as proofs that the mammal must have descended from the lower forms, because in its embryonic development it has some of the same peculiar membranes as have the lower animals.

IV

When Louis Agassiz crossed the Atlantic to America in the fall of 1846, and afterward became established as professor in Harvard University, he laid the foundation for more scientific delusions and deceptions than perhaps have ever otherwise been brought to this country from the outside. He was a talented man, a very fascinating and energetic teacher,

and was almost a zealot in his religious devotion. He saw the strong rising trend toward the theory of organic evolution, which he detested and fought all his life. And yet in my opinion he accomplished more in laying the foundation for that theory than any other man who ever lived, except Charles Lyell. I am not here speaking of the *finishing* of the doctrine, which was done by Darwin. But in the *foundation* for the doctrine as propagandized during the later nineteenth and the early twentieth century, Agassiz was the chief surveyor and engineer in biology, just as Lyell was the leader in the strictly geological part.

I shall not speak of the foundation of the glacial theory, which was also laid by Agassiz, with all his extravagant enthusiasm, in which he pictured glaciers in the valley of the Amazon and indeed all over the world. It was his method of comparing the embryonic development of the individual animal with the geological succession in time of all the animals, and in comparing both these series with the classification series of all the animal forms, that started the world on a wild-goose chase of fantastic speculation, which has only lately begun to be discarded for the blunder which it really was. And this method of comparison instituted by Agassiz deserves more than our passing attention.

Agassiz had been a pupil of Cuvier, the chief founder of half a dozen of the biological sciences, and the great apostle of the theory of many successive catastrophes in geology. He postulated only a comparative few of these world-wide desolations, but Agassiz thought they might number four or five dozen, possibly a hundred. But since his day the subdividing of the "index fossils" on which the geological chronology is based has gone to such lengths that, if Agassiz were alive today and held to the same principles as before, he would have to postulate several hundreds of these successive world desolations, and of course a corresponding number of new creations.

I have already pointed out how Karl von Baer, the founder of embryology, had announced a sort of rough parallelism between the embryonic development of the single individual and the geological history of all the earth's organisms from the Cambrian to the Pleistocene. Agassiz was an ardent admirer of Von Baer, who was an elder contemporary, and he resolved to carry out this idea in the actual classification of the fossils, making the embryology of any specific group the guide in arranging the fossils of that group in chronological order. In those days the sciences of paleontology and geology were still in their early stages, and many changes in the supposed chronological order of the strata had already been made; for these arrangements are made by card indexes in the libraries and museums, not in the field, and the order in the field can always in one way or another be made to conform to what is thought *ought* to be the true chronological order. This always has been the *modus operandi* of geologists and paleontologists when in difficulty, as is proved by innumerable shiftings of the positions (in the card index) of formations, and also by the modern popularity of such subterfuges as "deceptive conformities" and "thrust faults." It is impossible to get a geologist in a logical corner when he is armed with such weapons as these, for he has a way of escape from every dilemma.

And so in the days of Agassiz, under the strong wine of his magnetic enthusiasm and the rapid multiplication of astonishing discoveries in biology as well as in geology, the idea of the embryonic development's being the guide to the geological succession spread like a fire on a dry prairie. Haeckel took it up and made it the most seductive line in his monistic propaganda. Darwin also incorporated the idea in all his later editions of the "Origin of Species." And even today, although a profusion of discoveries have discredited the recapitulation theory in the eyes of careful scientists, one still finds belated arguments about "gill slits"

and "vestigial organs" used in books and lectures which propagandize the evolution theory.

But Agassiz refused to follow along the road on which he had started so many of his pupils and his contemporary scientists. He revolted more and more at the strong anti-Christian and atheistic tendencies which appeared among the evolutionists in the sixties and seventies of the nineteenth century. But near the close of his life, as reported by Professor A. S. Packard, one of his former students, he made the following pathetic acknowledgment:

"The greatest mistake of my scientific life has been in fighting the theory of evolution. I saw that it was coming for years, and my 'Essay on Classification' was written largely to forestall it. I believed it all wrong; but now I see that it will prevail."[7]

What Agassiz did in his books was essentially the same as he used to do in his lectures before his students and general audiences. He would stand diagrams of the embryonic development of typical animals up alongside diagrams of the taxonomic series from the amoeba to the mammals; he would place also alongside these two the diagram of the geological series from the Cambrian to the Pleistocene; and he would call attention to how much they all looked alike.

Of course, he never told his hearers that the embryonic series is the only one of the three that is an honest reality, the only one that has a real objective existence. He never called attention to the patent fact that the taxonomic series from the amoeba to man is only an artificial construct, only a plan of arrangement, capable of endless adjustment according to the opinion or the whim of the taxonomist. He never called attention to the fact that the geological series is just as artificial, and just as susceptible of change and adjustment according to the whim of the geologist. He probably would not have admitted this artificial nature of the geological series,

[7] Reported by J. S. Kingsley, in *Science*, February 27, 1925, pp. 234, 235.

even if it had been pointed out to him. But it is an artificial arrangement just the same, as has now been abundantly proved by our modern discoveries. Thus there is only one real natural series out of his three; the other two are purely artificial.

But even if we admit that these two, the taxonomic and the geological, have a certain objectivity, which I cannot admit, even then all that Agassiz really had was an analogy, a comparison. And what can one really *prove* scientifically by an analogy? He can prove only a comparison, a similarity, absolutely nothing more.

But this working by analogy was always the main style of argument of Darwin also. He and his followers were always making comparisons by comparative anatomy, showing how the limbs of a man, and a horse, and a seal, and a mouse resemble one another. They would also take up the comparisons made by Agassiz, and would call attention to the wonderful (?) fact that the embryo of a mouse or of a human being began as a one-celled form, like an amoeba; how it gradually acquired a structure of multiple cells, all the higher forms paralleling the growth of some of the lower forms up to the gastrula stage; how from there on the lower vertebrates and the mammals also had very much the same sort of development. Of course, most of the advocates of the evolution theory, notably Haeckel, but thousands of other who followed Haeckel's methods, used various other tricks and manipulations of the actual facts to make their comparisons seem stronger than they would otherwise be.* But they all dealt chiefly in analogies, in comparisons; and yet by these mere analogies they made a propaganda of such force and driving power that in two or three generations

* I have in my possession a pamphlet of 104 pages, entitled: "Haeckel's Frauds and Forgeries" (Bombay, 1915). It deals with some of the most notorious tricks by this fanatical propagandist of atheism, but some of Haeckel's most effective and far-reaching deceptions are not alluded to at all.

they have actually changed the mental attitude of the entire world.

True, they thought they had a solid and trustworthy *history* of living things during many tens of millions of years, as presented in the fossils. And of course this apparently trustworthy history was in reality the main foundation of their whole argument. Even today, this supposedly reliable succession of the different kinds of fossils in a progressive sequence is still by all odds the main part of the theory of organic evolution, for aside from this evolutionary geology and the supposed fact that modern "species" seem capable of slight changes now and then, the entire remainder of the evolutionary argument is based on mere analogies or comparisons. But the alleged resemblances of the young embryo to some of the lower forms of life is still being used as one of the chief arguments in favor of evolution.

V

In the earlier days of the evolution theory, it used to be said that man's body is full of "vestigial organs;" that is, organs which he has inherited from his animal ancestry, but which are now useless to him, only so much junk or museum stuff which he has to carry around. Among such "useless" relics of the past were listed the thyroid gland, the adrenal gland, the thymus gland, and even the spleen and the vermiform appendix. But as Paley declared more than a century ago, our list of "useless" structures decreases as our knowledge increases. And with the discovery of actual secretions made by these ductless glands, we hear less about them now as "evidences" for evolution.*

* In *Nature*, December 6, 1930, page 878, I find J. von Uexküll quoted regarding "vestigial organs," to the effect that whenever such an organ has been tested, some function for it has always been revealed, and saying: "It is to be hoped that 'vestigial organs' will soon disappear into oblivion."—"*Theoretical Biology*," p. 112.

Douglas Dewar has called attention to the need of distinguishing between "rudimentary" organs; that is, organs which are now in a nascent condition and on their way to further development, and "vestigial" organs,* which were once more developed or more useful than at present. Too often evolutionists have not been careful in making the distinction. There are calves born with the roots of horns which never develop, cats with tails that never grow, fishes and other animals in caves which at maturity have only the stalks of eyes, and many other examples which might be mentioned. These are true "vestigial" organs, and are good arguments for degeneration. But there is not a single well-authenticated case of a genuine "rudimentary" organ known to comparative anatomy throughout the entire animal kingdom.

The vermiform appendix has been pointed to as a "vestigial" organ, now useless to man, inherited from animals which formerly used it. Darwin so taught, and so have most evolutionists since that day. But more recently a careful checkup has shown that, while every child is born with a normal appendix, the organ keeps on developing until a certain maximum is reached, and then slowly declines. Among the Swiss this maximum of size is reached at the twentieth year; among the population of Edinburgh this maximum is not reached until the age of forty; while among the Filipinos, who are chiefly vegetarians, the maximum is on the average attained at sixty. Sir Arthur Keith, from whom I have derived these facts, adds the quite obvious remark:

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* In a previous volume, "The Phantom of Organic Evolution" (Revell, 1924), which is now out of print, I discussed several of these so-called "vestigial" organs. Also in the early winter of 1926, while in England, I had an interesting discussion with Professor Julian S. Huxley, the grandson of T. H. Huxley, who had stated that "the human embryo not very long before birth is covered all over with long hair." As a result of our discussion he modified the statement to say that it is "covered with hair—long on the scalp, fine and short on the rest of the body." Such is the sad fate of the myth about the lanugo. Dr. Cyril B. Courville, of the White Memorial Hospital, Los Angeles, is writing some very valuable papers on the recapitulation theory, the first of the series having appeared in *The Bulletin of Deluge Geology and Related Sciences*, August, 1941. The address of this journal is 219 N. Grand Avenue, Los Angeles, California.

"An organ which increases in length until the twentieth year, or even until the fiftieth, does not merit the name 'vestigial.' "[8]

Keith also gives us this sensible summary of the case:

"The evidence, such as it is, leads us to believe that when the appendix breaks down under the conditions of modern civilization, it does so not because it is 'vestigial,' but because of its inability to withstand the conditions to which it is being exposed."[9]

And yet the argument based on "vestigial organs" was one of the supposedly strong arguments by which the theory of organic evolution was built up. Even to this day it is used in all formal arguments for the theory. It was an argument which had a strong appeal to the public of the past generation, because at that time the physiology of these organs was not well understood. In other words, it was an appeal to ignorance. Today, whenever it is presented as an argument for evolution, it is not so effective, for many people now know the functions of these organs. But the argument is still being used in many places and in many countries, such as China, Japan, and South America, among those whose average intelligence is not very high. But even here in America you will find the argument still presented in most books and pamphlets which give in a formal style the arguments for organic evolution.

VI

But another theory of embryology needs to be considered in some detail, for it is still very much alive today, though it has assumed a more recondite or transcendental form. I refer to the preformation theory, as it has been called, which is the logical predecessor of the modern theory of the genes, the latter being very widely held at the present time, especially here in America.

[8] *Nature*, December 12, 1925, p. 867.
[9] Ibid.

William Harvey, the discoverer of the circulation of the blood, had the right idea. He said that all the higher forms of life come from an egg; and although in his day no microscopes had yet revealed the ovum or the sperm of mammals, his general views of nature led him to the truth in this instance also. It was another century before it became known that it takes a union of the male and the female cells to start a new individual. But in the meantime one of the leading teachers of medicine of the time thought that he could recognize the form of an embryo chick in an unincubated egg. This mistake gave a start or a seemingly scientific foundation for the strange doctrine of *preformation,* or the idea that a minute individual already exists preformed in the egg, and needs only suitable conditions to bring it to full development. This doctrine that a complete individual lies in the egg held almost complete sway in the scientific world for more than a century. In its later form it became a doctrine of *incasement* or *inclusion,* a sort of Chinese box-within-a-box theory, under which it was taught that all the descendants of the first female must have been held in miniature within her ovaries. Singer thus describes the theory:

"If the being in the egg be complete, it must contain ovaries and ova. And if such secondary ova are present, they also must contain complete beings, and so on in a process of *emboitement,* like a series of Chinese boxes. Eve, it was held, had within her ovary the forms of all the men and women that were to be. One writer estimated them at the very moderate figure of twenty-seven million. This remarkable theory long held the field."[10]

When the male sperm was discovered, and it became established that only by a union of the sperm and the ovum was a new individual started in development, there ensued a most absurd battle between "spermists" and "ovists," the former contending that the male cell is the one that contains all the

[10] Charles Singer, "The Story of Living Things," p. 498. New York: Harper & Brothers, 1931.

succeeding progeny, and the latter claiming that the female cell is the all-important one. The medical and biological books of the time contain pictures of little human beings within the one or the other of these cells, according as their authors took the one side or the other in the grotesque controversy.

It was a young medical student, Caspar Friederich Wolff (1738-1794), who in his essay for the doctor's degree declared war on the prevailing preformation theory, and advocated the theory of *epigenesis,* which contends that in the formation of a new being there is a real appearance of something which was not present before, even in rudiment. Epigenesis is thus the direct opposite of preformation, and all the world now admits that the former is right and the latter is wrong. But Wolff himself had been dead and forgotten for years before his embryological discoveries were again called up for the consideration of the scientific world. Such is the inertia of scientific zeal for real truth which opposes a long-established error.

Now I readily grant that epigenesis is not capable of "scientific" explanation. It is not capable of "explanation" in terms of mechanism, or even in terms of that favorite modern word "organization." For the very meaning of the word is that something new appears, something which was not there before.

The late E. B. Wilson, in his monumental work, "The Cell in Development and Inheritance," admits that the problem in discussion between preformation and epigenesis is perhaps "scientifically insoluble;" but so is the problem of the origin of life. Wilson then proceeds:

"Weismann and Driesch . . . alike express the opinion that fundamentally epigenesis is inconceivable."[11]

[11] E. B. Wilson, "The Cell in Development and Heredity," p. 1110. New York: The Macmillan Company, 1925.

In every department of nature study, we sooner or later reach the dead end of all mechanical "explanations," and realize that we are face to face with God's direct acting. And the origin of a new creature, a frog, an elephant, or a man, brought about by the fusion of two microscopic pieces of two parents, is of course "inconceivable" on any mechanical or materialistic basis. It is not a new creation out and out, but it is about the nearest thing to a genuine new creation that we can conceive of short of the actual thing. And we do well to recognize it for what it really is—a proof of God's direct control of all that He has made.

VII

This problem of preformation versus epigenesis faces us at every stage of almost every department of biology, but it arises very insistently in connection with the modern studies of genetics and the problems of heredity. And all careful thinkers in these fields recognize the antithesis between a genuine epigenesis and any and every form of preformation, such as appears under the guise of the genes and the chromosomes, when the latter are taught as they have been by some of their more enthusiastic advocates. And inevitably, careful thinkers along these lines are now saying that the new creature develops epigenetically, its characters are not in any sense preformed or carried over from the parents by the genes or by any other merely mechanical means or methods.

I think I can explain what I mean by presenting some quotations from two recent writers. The first is from Dobzhansky, whose work on genetics has been already spoken of in the preceding chapter.

"The problem of gene action is far from having been solved. It is known in some instances that the formation of adult characteristics, such as size or coloration of the body or its parts, is preceded by the appearance in the developing organisms of chemical

substances of the hormone type which are operative in the processes that produce the adult characters. The great interest of such information is self-evident, although a physiologically minded biologist always would have taken it for granted that chemical precursors of the visible morphological traits must be active in development. The disappointing feature of this work is that to date it has failed to give a clear insight into the gene action proper."[12]

My second excerpt is from W. E. Castle, whose work on "Mammalian Genetics" appeared in April, 1940.

"On the basis of the gene theory, it was formerly assumed that chromosomal genes determined the size of each part of the body, and that the size of these different parts was, to some extent, independently determined, thus necessitating the assumption of an enormous number of genes influencing the size of the parts. We now see that such complicated assumptions are unnecessary. . . . Why the egg of one species should exhibit an organization different from that of another, we are unable to explain on the basis of either the chromosome theory or any other theory."[13]

Again this same writer says:

"It is impossible to explain the primary organization of the egg as due to immediate chromosome influence, for it arises in the presence of exactly the same assortment of chromosomes as is found in each cell of the body. Yet those body cells are highly differentiated parts of a complete organism. . . . It is not necessary to assume that the egg has an organization as complete and elaborate as that of the adult. Students of experimental embryology are very emphatic on this point. . . . Thus the development of the egg is largely epigenetic, determined step by step, it being necessary to assume only a few primary features in the organization of the egg at the outset."[14]

And again Castle declares:

"It is not necessary to suppose that all the successive steps of differentiation are predetermined in the egg and represented there

[12] Theodosius Dobzhansky, "Genetics and the Origin of Species," p. 10. New York: Columbia University Press, 1937.
[13] W. E. Castle, "Mammalian Genetics," p. 7. Cambridge: Harvard University Press, 1940.
[14] Id., pp. 5, 6.

by distinct genes. Only a very few of the more general features of organization can be discovered in the egg, such as regional differences in the composition of its cytoplasm. The enormously more complicated organization ultimately attained comes into existence as development progresses, epigenetically. . . . Chromosomal genes are comparable in their action to the hormones of the body. They affect the chemical composition of the cell so as to modify certain of its processes, just as hormones affect physiological processes in the body. Both are highly selective in their action."[15]

These remarks are true and timely. They may help to clear the air of extreme views about the chromosomal genes which, in certain quarters at least and in the earlier works on this subject, were almost as crude as the preformational theories of Charles Bonnet and his followers of a century and a half ago. Preformation is mechanical and materialistic; epigenesis is in harmony with the Christian doctrine of a Creator who is still actively managing and directly controlling all the works of His original creation. And it is encouraging to see that the latest and best of modern biology is outgrowing the crude preformation views originally associated with the genetics of chromosomes and genes, and is now recognizing that the development of the individual has in it something which cannot be explained on mechanical or preformational theories.

VIII

In 1882 Wilhelm Roux initiated the new science of experimental embryology, or "developmental mechanics," as some prefer to call it, by thrusting the point of a hot needle into one of the blastomeres, or cleavage cells, of a frog's egg at the beginning of cleavage. Since then a number of other workers have carried on similar experiments, most of which have to be performed under a microscope and with elaborate technique. The eggs of the sea urchin, the newt, and other

[15] Id., p. 8.

animals which in the adult form have strong powers of "regeneration" or renewal of parts when amputations of organs are performed, have been favorite subjects for these experiments. H. Spemann and Hans Driesch are some of the leading workers.

In the symposium volume entitled, "The Great Design" (1934), Hans Driesch has an interesting chapter on "The Breakdown of Materialism," in which he describes some of the results he has attained. He shows how the machine theory of Roux and Weismann regarded the young embryo at the stages of two, four, eight, or sixteen cells as already well differentiated off into particular parts or regions of the adult organism, so that each of the cells in the eight-cell cleavage stage is predetermined to form some specific part of the animal. His experiments very handsomely refuted this view. I quote Driesch himself:

"I separated, in the egg of the sea urchin, the two or the four cleavage cells from one another and got a *whole*, a *complete* organism out of each of these cells. And I changed, in the eight-cell stage, the position of the eight cells with respect to one another, without taking away anything, and got by no means, as the mechanistic machine theory would have predicted, a quite disordered form, but a *normal* larva. This proved, then, that there certainly was *not* any sort of predetermination of the single cleavage cells.

"And, further, if in the stage of about 1,000 cells, I cut away *any number* of cells I liked, say 50 or 112 or 203, at *any place* I liked, the remainder gave me a *complete normal* larva of smaller size. There was, then, quite certainly nothing to suggest a machine-like predetermination.

"Finally, on the other hand, *two* eggs could be forced to combine, the result being a single organism, each of the two eggs developing into one half of it.

"All these experiments have been repeated with the same result by zoologists who worked with the eggs of fishes, newts, medusae, insects, etc. If it were possible to work experimentally with the egg of man, the result would most probably be the same."[16]

[16] Hans Driesch in "The Great Design," pp. 287, 288. New York: The Macmillan Company, 1934. Used by permission.

It would be out of the question to discuss the many conclusions which are established by these and other somewhat similar experiments. It is true, certain other kinds of eggs, such as those of ascidians and certain kinds of mollusks, do not respond as readily to the drastic manipulations mentioned by Driesch; and I think it extremely unlikely that the eggs of any mammal would give such results, even if similar experiments were physically possible.

IX

The early evolutionists practically ignored physiology, and concentrated their attention upon comparative anatomy. Anyway, people of that time knew very little about physiological processes, and anatomy was more spectacular in its appeal. Lamarck had explained the giraffe's long neck as the result of its continuously stretching up to get leaves and twigs from high bushes and trees; while Darwin said that this animal's long neck and front legs were due to the lucky accident that some animals had longer neck and legs than others, and in difficult times they could survive and leave descendants, while all the others left no posterity. Wading birds, like the crane and the flamingo, were similarly only the lucky survivors in the fierce struggle for existence, according to Darwin; while according to Lamarck, their abnormal anatomical parts were the result of having to get their food out of the water and stretching for it so as not to get their feathers wet. In these and thousands of other instances, it was always the anatomy of the animals and the form or outward appearance of the plants which were dealt with by the early evolutionists. The wonders of physiological function were almost entirely ignored.

I want to present a selection from a modern author, to show how the matter now stands in the eyes of one who is acquainted with the modern discoveries in physiology:

"This brings us to the empirical critique of selectionism [Darwin's theory], and we shall choose only one decisive point. It is impossible to base the construction of a mechanism which is more complicated and more purposeful than all our machines, on the play of accidental variations. Even if selection explained the origin of morphological characters, it would surely not suffice for the physiological ones. Consider, for example, the liver cells, in which, according to our present-day knowledge, some ten, probably many more, chemical processes—all absolutely necessary for life—take place, in a space no greater than about one-hundred-thousandth part of a pin's head. 'Is it credible that such a chemical laboratory, in comparison with which our chemical laboratories are the merest child's play, can be accidently thrown together by the accidental play of molecules and atoms?' "[17]

Or let us consider for a moment those internal secretions called *hormones,* the secretions of the ductless, or endocrine, glands over which the early Darwinists made so much fuss as "useless" organs. Hormones are of many kinds and are produced by various glands. They have been compared to chemical messengers which carry instructions by postal service, in contrast to the telegraphic messages sent by the nerves. Of course, these are only our crude, mechanical comparisons; in reality they are a part of that wondrous co-operative system, all under the direct control of the Creator, by which the intricate physiological functions of the animal organism are kept in harmonious operation. We have no reason to doubt that actual substances are sent along in the blood stream, for several of them have now been synthesized, and appear to have the same effects. But how does it come that a gland in one part of the body becomes aware of a need in a distant part, and sends the proper substance there on time, often ahead of time, or in anticipation of a need soon to appear? And how does it come that at the end station, the part of the body there knows how to pick out of the blood

[17] Ludwig von Bertalanffy, "Modern Theories of Development," p. 40. Oxford University Press, 1933. The latter part of this quotation is itself a quotation from another German author, K. Sapper.

stream just what it particularly needs, rejecting all the dozens or hundreds of other chemicals that are also passing along in the common carrier, the blood stream? But above all, and it is the supreme question from the viewpoint of this chapter, how is it that all this complex differentiation of cells comes from one single, undifferentiated cell, the fertilized ovum, which in appearance is not very different from all other cells, and of microscopic size?

Many say an entelechy, but this is only a clumsy, pagan name for the Jehovah of the Bible, the Creator.

"Blin', blin' mon they be who canna see the finger of God i' this thing."

CHAPTER SIX

Species Old and New

I

FEW scientific words have been more disputed about and misunderstood than the word "species." Karl Linnaeus (1707-1778), the Swedish botanist who taught the world the system of classifying the animals and plants now in use, including the binomial system of naming them, was liberal in his method of classifying them. A statement of his has often been repeated: *"Varietates minores non curat botanicus,"* or, a botanist disregards minor variations. But with the vogue of Darwinism, these minor variations, called variously subspecies, microspecies, geographical races, and varieties, came to be looked upon with great interest, because it was thought that they were just species in the making, or the ones from which genuine new species might ultimately develop. Even yet there are some who stoutly contend for this point of view, though the study of Mendelism and modern genetics has tended to discredit this idea.

Linnaeus had only four ranks or grades in his system of classification: the species, the genus, the order, and the class. It was not long, however, before the *family* was added for a group or classification between the genus and the order; and later, after the evolution theory became popular, the word "phylum" was introduced to mean the larger group which had all sprung from one original. Thus this latter term

is etymologically biased in its meaning, which cannot so truthfully be said of the others; but it is already so firmly established that we must continue to use it.

When Linnaeus first began his work, he was inclined to lump the dozen-odd kinds of wolves (or dogs) all together; he wanted to put the three dozen cats (lions, tigers, etc.) all together, and all the kinds of pines into one group, and so on. Soon, however, he became more exacting in his distinctions, and during his long life he saw the work of classifying and naming rapidly advanced, with the constant tendency to make the distinctions finer and finer. Before he died the term "species" was in general almost what we now understand by the word. In very many instances, however, what he termed a genus has now been made into a family; while for the groups higher in the scale there has been no end of dividing and subdividing, all for the purpose of trying to show more precisely how certain types have evolved from simpler originals. Endless confusion and misunderstanding have thus been brought into the discussion of these subjects, and in these higher ranks of classification every man seems to do that which is right in his own eyes, two of them seldom agreeing.

Even in the matter of genera and species there has always been a lively contention between the "lumpers" and the "splitters." This is as true in botany as in zoology, though the splitters have so long prevailed over their rivals that more and more fine distinctions have been adopted. In the naming of the fossils, as will be mentioned presently, where no such tests can be applied as can be used to check up on alleged specific distinctions between the kinds of plants and animals, and outward form alone is the basis of classification, the splitting of species has run riot, and has been used in a biased and unscientific way to propagandize the theory of evolution. Thus the *spirit* of not bothering about fine distinctions, with which Linnaeus began his work, has completely changed, and the resulting confusion and wrangling have long made it

almost impossible to look at the problem of the "origin of species" in any broad or common-sense way.

Asa Gray (1810-1888), whose works on botany were the standard textbooks when I was beginning the study of science more than half a century ago, listed 41 orders and 146 families of flowering plants (exclusive of the cultivated kinds) in the northeastern United States. Modern botanists now list a great many more, not because many new plants have been discovered in this region, but chiefly by raising families to the higher rank of suborders or even orders, and by making new families out of groups of genera.

Such tendencies are not, however, so confusing as when a specific name is made into a genus or the generic name is changed entirely. For instance, Linnaeus in 1753 listed the box elder with the maples, as *Acer negundo,* for it resembles the maples in many respects. But forty years later Moench, a Continental botanist, erected it into a distinct genus under the name of *Negundo aceroides.* Today F. Schuyler Matthews lists this tree under the name originally given by Linnaeus, though the Standard Dictionary gives its name as *Rulae negundo.* Some botanies give the mountain ash as *Pyrus americana,* putting it in the same genus as the pear, but some list it as *Sorbus americana,* putting it with the shadbush or serviceberry. The apple itself is listed under at least two different generic names.

How is the nonspecialist to navigate his way among such confusion?

In 1923 Hall and Clements, working under the Carnegie Institution of Washington, wrote that in the Rocky Mountain region alone, the number of "genera" had about doubled in the preceding thirty years, while the number of "species" had been multiplied from 1,905 to 5,100.[1] These field workers

[1] H. M. Hall and F. E. Clements, "The Phylogenetic Method of Taxonomy," pp. 10-15. Washington: Carnegie Institution, 1923.

deplore this tendency toward the confusing multiplication of names, and say, at least in regard to the botany of North America:

"The great majority of real species had been described by the close of Gray's work, and the vast increase of species since that time chiefly represents a change of personal views as to the criteria that mark this unit."[2]

These authors protest against the modern craze for manufacturing new generic and specific names, and say:

"If taxonomy is to be either stable or usable, it must still rest upon the species concept of Linnaeus and the practice of eminent taxonomists from his time to the present."[3]

William Bateson once gave the namemongers the ironic advice to publish and describe under their new classifications all the "new" species which they could induce any reputable journal to print; but this becomes a dangerous kind of joke when the speciesmongers occupy influential positions and can get their lists and new classifications printed at the taxpayers' expense.

II

David Starr Jordan tells us that Rafinesque, the French-American botanist and traveler, "once sent for publication a paper seriously describing, in regular natural-history style, twelve new species of thunder and lightning which he had observed near the falls of the Ohio."[4] But the geologists and paleontologists can even outdo Rafinesque in their manufacture of new names for the fossil trilobites, brachiopods, mollusks, and ammonites. For these workers with the fossils unblushingly tell us that they do this for the express purpose of helping to smoothe out the transition between the different

[2] Id., p. 12.
[3] Id., p. 15.
[4] David Starr Jordan, "Science Sketches," p. 165. Chicago: A. C. McClurg & Co., 1896.

geological "ages," and to give more precise "dating" for the successive "horizons."

For example, Sidney S. Buckman (1860-1929), the English specialist in fossil ammonites, elaborated the subdivisions of the Jurassic formation into four hundred zones of successively different kinds of ammonites, so that under his manipulation the Jurassic period became "divided into forty-five ages and about four hundred hemerae or biological time units."[5]

Why not? Since the fossils always and everywhere are used to date the age of the rocks, why not make just as minute distinctions as are possible among the fossils, thereby increasing their "value" as time markers, and helping enormously in "proving" the evolutionary development of the various kinds of animals and plants?

Zittel, the eminent Munich historian of geology and paleontology, tells us that this is exactly what has been going on in the case of the fossil trilobites, brachiopods, and other invertebrates. For by this mania for inventing new names, to the utter confusion of all broad or liberal study of the fossils, to quote Zittel's scathing words:

> "There has accumulated a dead weight of stratigraphical-paleontological literature, wherein the fossil remains of animals are named and pigeonholed solely as an additional ticket of the age of a rock deposit, with a willful disregard of the much more difficult problem of their relationships in the long chain of existence."[6]

But other workers were not slow in taking the "assured results" of such paleontological splitting and subdividing, to help build up a pseudoscientific proof of just how the various kinds of animals have changed from one form to another throughout geological "time." Speaking especially of the

[5] *Science*, July 26, 1929, p. 88.
[6] Karl Alfred Zittel, "History of Geology and Paleontology," p. 375. London: 1901.

brachiopods, Zittel goes on to say that the new fashion in this line of work—

"tries to restrict generic and specific definitions within the narrowest possible limits, in order to enhance the value of fossil brachiopods for the characterization of stratigraphical horizons."[7]

"The number of genera has been greatly increased, and in many cases species have been elevated to the rank of genera. A new classification [of the brachiopods] was proposed in 1889 by [C. E.] Beecher, in which it has been the author's aim to bring the ontogenetic and phylogenic development of the group into more apparent correspondence."[8]

Such were the methods by which the fossil "evidence" for organic evolution was manufactured to order. With a host of men in various countries all enthusiastically working to select scattered specimens from here and there over the earth and manipulate them in such a way as to show an apparent chronology, there is little wonder that in all the various groups of fossil animals the embryonic and the evolutionary development of almost any group could be brought "into more apparent correspondence." And when the distinctions between "species" are made as fine and minute as possible, there is no difficulty in using the newly created "species" to "enhance the value" of such fossils in dating "stratigraphical horizons," and thus still more clearly "proving" evolution by this beautifully circular method of reasoning.

Shame, that any group of men who claim to be following natural science, and upon whose announced results so much has been built up through sheer faith in their reliability, should so brazenly mislead a confiding world. For it is upon this manipulation of the fossils, masquerading as "science," far more than upon any other one line of work, that the theory of organic evolution still holds together today. The supposed modern origin of new "species" is a mere side issue,

[7] Id., p. 400.
[8] Ibid.

a verbal quibble, as compared with this, the very foundation stone of the modern theory of evolution.

III

About the middle of the preceding century, the French botanist Jordan made some experiments to determine the nature of the minor groups, varieties, or races, which are well-recognized features of most species. These varieties usually have special geographical habitats; they have proved to be perfectly cross fertile with one another; whereas on the other hand genuine "species" often overlap on one another's territory, and do not naturally mix or interbreed. In mere outward appearance some varieties may seem farther apart than some species; but the geographical distribution and the breeding habits are usually looked upon as important criteria in deciding whether certain kinds are to be regarded as genuine species or only as races or varieties.

However, Jordan transplanted many so-called varieties from their native places to the uniform soil of his garden, and found that they preserved their distinctive characters, and came perfectly true to seed. In this way he concluded that these races or varieties are just as true and constant as the recognized species of Linnaeus. Since then, these true-breeding varieties have often been termed Jordan's species, to distinguish them from those of Linnaeus. But the existence of these constant or true-breeding varieties within a species has given rise to no end of dispute and trouble among botanists and zoologists. If the Negro, Mongolian, and white races of mankind would only keep to themselves and refuse to mix or interbreed, they would greatly resemble these Jordanian "species;" and they may serve to illustrate the subject. And if human beings were as true to their better instincts as are most of the animals and the plants, they would doubtless maintain the sharp distinctions which usually prevail between

races, even though they may all be descended from a common stock.

Theodosius Dobzhansky, whose recent work will be spoken of more fully later, remarks:

"Of late, the futility of attempts to find a universally valid criterion for distinguishing species has come to be fairly generally, if reluctantly, recognized. This diffidence has prompted an affable systematist to propose something like the following definition of species: 'A species is what a competent systematist considers to be a species.'"[9]

And yet one fact is emerging from all this uncertainty; namely, these races or varieties are *not* the beginnings of new species, as Darwinists have so long taught. The following from Dr. J. C. Willis is very positive on this point, and I believe is the real truth on this subject:

"We have no evidence to show that a Jordanian species will proceed further towards a Linnaean species."[10]

Furthermore, I believe that this author is right in the following statement:

"It is clear that . . . the species *cannot* be composed of many true-breeding microspecies, but that the formation of these must be later in the life of a species than the formation of the species itself, and that it is *after* it is formed that a species breaks up into microspecies, not that a species is formed by the accumulation of micro-differences."[11]

He goes on to quote William Bateson as in harmony with this general idea, and declares that no leading systematist has ever adopted the view that these minute races or Jordanian "species" are the ones to be considered the true "species."

On a later page Willis gives what seems to me the most reasonable view of the wide variety which we find in nature

[9] Theodosius Dobzhansky, "Genetics and the Origin of Species," p. 310. New York: Columbia University Press, 1937.
[10] J. C. Willis, "Age and Area," p. 216. Cambridge University Press, 1922.
[11] Id., pp. 216, 217.

—namely, that it has resulted from a fractionation, or splitting up, of original kinds.

He quotes H. B. Guppy, another competent botanist, as agreeing with him that—

"evolution did not proceed from individual to variety, from variety to species, from species to genus, and from genus to family, but inversely, the great families and genera appearing at a very early period, and subsequently breaking up into other genera and species."[12]

All this is certainly more in accord with the known history of the human race, and probably more in harmony with the ways in which the great variety of plants and animals came about from the (probably) small number (comparatively speaking) of kinds surviving from the flood and preserved in the ark, on the basis of the Bible record. Using the language of modern genetics, we can say that the family of Noah (and Adam and Eve themselves, for that matter) were *heterozygous,* or genetically capable of giving rise to different kinds of offspring, the result being that as their descendants have multiplied, so variety and differences have greatly increased. And the same in general has been the history of the plants and animals. This is certainly the Biblical view of these matters; and it is now being proved to be in accordance with modern study and discovery.

IV

As in his day there was no evolution theory to confuse him, and as he was a reverent, religious man, Linnaeus aimed to make his species equivalent to the different kinds which had been originally created, so that in his scheme each "species" would include all the modern representatives of each created "kind." This was a proper enough aim; but how was a

[12] Id., p. 221.

system of classification based on this idea to be carried out in a scientific way?

Under the scheme of Linnaeus each species was thought to be distinct from all others, and also quite incapable of crossing or hybridizing with any others. But after the rise of Darwinism, scientists went to the opposite extreme, and the entire world of organisms was considered to be in a state of flux; and it became fashionable to deny that any such entity as a "species" really exists in nature.

Then came Mendelism. The study of cells has advanced enormously, and by the experimental breeding of genetics we have learned many things, with the general result that the views of modern scientists have swung back very decidedly in the direction of Linnaeus. The chromosome number of each species is constant; and acquired characters are not transmitted to the next generation.

But the counting of chromosomes is now made use of to help determine just what a "species" really is. Professor C. C. Hurst, of Cambridge, England, read a paper before the Oxford meeting of the British Association in 1926, in which he reported the progress which had then been made in using the chromosome numbers as an aid to the other long-established methods for determining what a species is. Hurst had made a study of the genus *Rosa;* and his conclusion was that there are five fundamental species of *Rosa.* The basic number of chomosomes is seven, the diploid number (that is, the number of paired chromosomes before reduction division) being fourteen. But many of the species of *Rosa* have multiples of fourteen, such as twenty-eight, forty-two, or even fifty-six. Those belonging to any one of these "species" will cross, sometimes even those of different chromosome numbers; and by computation Hurst thinks he can tell the number of possible combinations, though the five basic species seem to be cross sterile, the combinations being within the basic species. It is a complicated business; but eventually roses

and other plants, he thinks, will be classified largely by the examination of their chromosomes.

But Hurst's conclusion is interesting:

"In accordance with this conception, a species is a real entity, corresponding to the intuitions of the old systematists, though they were unable to demonstrate it experimentally."[13]

V

But now, with it settled that a "species" is a genuine unit of living things, and actual entity in nature, the question arises, Can different species be crossed or hybridized? and if they can, with what result?

Certain facts have long been known about the behavior of hybrids. Many hybrids of races or varieties are more vigorous than the parents. This is termed hybrid vigor. The mule is a hybrid between what are termed species; and the mule is a very efficient farm animal. But the mule is sterile —with some exceptions. A hybrid rose is often hardy and has large blooms; but it may never mature any seed. Many fine plants sold by nurserymen have to be propagated by cuttings or grafts; for they produce no seed. The navel orange is an example. Hybrid corn is very vigorous; but it has been found that wheat is best when the strain is kept pure.

More recently many crosses have been accomplished between what have always been regarded as distinct "species." A few years ago a Russian obtained a perfect cross or fertile hybrid between the radish and the cabbage. These have always been classed as distinct genera. Usually such crosses, if effected at all, are sterile; but in this case a multiple number of chromosomes was produced, and the result is a new "genus" which breeds true and is perfectly fertile. It has

[13] *Science*, March 18, 1927, p. 272.

been named *Raphanobrassica,* which is a combination of the scientific names for the two genera, radish and cabbage.[14]

This is an extreme case, and may only mean that the group of the mustard family to which these plants belong is more capable of diversification than others. We do not seem to be getting any nearer to a fundamental knowledge of the nature and behavior of "species." It seems quite unreasonable to think that this example of artificially induced hybridism is to overthrow the fact that in hundreds of thousands of cases genuine species of living things never cross in wild nature, and cannot be induced to do so under human manipulation.

Mendelism on the whole tends to show the wonderfully stable character of genuine "species." But as a speaker at the Cardiff meeting of the British Association in 1920 declared: "Mendelism is a theory of heredity; it is not a theory of evolution."

One of the most obvious facts of all nature is the stability of living things, the way in which they persist from age to age without observable change. Think of the many kinds of brachiopods or what not which are found as fossils in the Cambrian or Silurian or Ordovician rocks, and which are the duplicates of kinds now living in our present oceans. This persistence of species, or their resistance to change, has been termed the strongest argument against the theory of organic evolution. I regard the logical breakdown of the theory of successive geological "ages" based on fossils as by far the strongest argument, the completely devastating argument; but the persistence of species is certainly a strong supporting argument against the whole scheme of organic evolution by means of transformism.

As is well known, Thomas Hunt Morgan and his assistants have been experimenting with the fruit fly, *Drosophila*

[14] See *Science* Supplement, May 11, 1928.

melanogaster, for about a quarter of a century, which at the rate of 25 generations of the flies a year would make about 600 successive generations of these flies, which would be the equivalent of 20,000 years for mankind. During this long line of experiments with registered, pedigree flies, more than 500 "new" kinds or mutations have appeared, really most of them degenerate freaks which could not by any stretch of the imagination be able to fend for themselves in wild nature. Not only so, but the same mutations keep reappearing again and again, until it seems that these experiments have about come to a dead end. Experimental breeding may produce plenty of freaks, but no new "species" in the proper scientific sense.

The late Dr. Raymond Pearl, the well-known editor of the *Quarterly Review of Biology,* wrote as follows in another magazine:

"Genes are almost incredibly stable and resistant to alteration in the natural and usual circumstances of life. For something over fifteen years there has been going on in my laboratory a continuous experiment designed to test this point in a simple and direct way. This experiment has now included over 300 successive generations—perhaps the longest bit of controlled breeding ever carried out, with the results in each successive generation carefully observed and precisely recorded. . . . The net result of the experiment has been to show that the gene involved has preserved its initial characteristics unaltered. So has the cellular mechanism for the shuffling and sorting of the genes in each generation. The demonstration of the inherent stability of the genic mechanism of heredity given by this experiment is extremely impressive."[15]

With all this agree the words of a very recent textbook on zoology, which, unlike most textbooks, does not seem to be ten or fifteen years behind the best contemporary knowledge:

"Perhaps the most remarkable fact about mutations is that they always are indifferent or harmful to the organism, usually the lat-

[15] *Harpers Magazine,* January, 1936, p. 226.

ter. No example is on record of a mutation that made a plant or animal more fit to struggle for existence."[16]

This author goes on to state that sometimes mutations which turn up at random are more useful to man; and he cites the case of the Ancon breed of sheep, made famous by Darwin. This breed was considered useful, because its abnormally short, bowed front legs prevented it from jumping fences. Polled cattle are similar mutations which are useful to man. But such mutational changes would not enable the creatures thus made to get along better in the wild or natural state.

This same textbook has some other things to say about this matter of mutations:

"Chromosomal aberrations give peculiar forms, but nothing new except in the sense of a 'reshuffling of the cards.' Mutations indeed are new, but are changes in the downward direction. In *Drosophila,* in domestic animals, in tomato, in *Datura,* wherever they have been scrutinized, they result in an organism less fit to succeed in growing and reproducing. This may account for loss of parts, as for example in parasites, but not for the origin of new organs. There is more evidence for retrogressive changes than for progressive."[17]

It is high time that these true words should get into the consciousness of the reading public. They are the most enlightening words that I have seen in a school textbook on biological subjects in many a year.

However, here is a similar statement from one of the chief workers with Thomas H. Morgan in the *Drosophila* experiments:

"Any considerable experience with mutant races will convince one that the viability of a mutant race is, on the average, inversely proportional to the degree of its difference from the parent race. In other words, the greater the change produced by the mutation,

[16] William J. Tinkle, "Fundamentals of Zoology," p. 120. Grand Rapids: Zondervan Publishing House, 1939.
[17] Id., p. 445.

the more likely is it to interfere with the proper functioning of the organism."[18]

All of this seems to indicate that the Lord has made the various animals and plants with certain natures, certain innate characteristics; and whenever either in wild nature or under human manipulation and experiment the organism departs from this standard, it is worse off than before, and this worsening is registered in the next generation.

VI

The word "heredity" covers all those ways in which an offspring resembles its parent. "Variation," on the other hand, represents all those ways in which an offspring is different from its parent. Thus heredity is a stabilizing influence, it is conservative, tending to maintain the status quo, while variation is the result of a pioneering tendency, a spirit of adventure, a production of something new.

The problem in this connection is: Can variation overcome heredity? If it can, to what extent can it overcome the hereditary tendencies of the ancestry?

Evolution really says that, in the long run, the tendencies toward variation have been sufficient down through the ages to transform a protozoan, such as the amoeba, into a horse or a man. Believers in creation deny any such possibilities in variation, though they admit that considerable changes are possible, such, for instance, as the *possibility* that all the bears of the world may have come from a common ancestor, that all the cats may be of common descent, or that all the dogs and wolves may have had a common origin. *Creationists do not claim to know the limits of such variations;* but they seriously question whether any distinct transformation of one genuine species into another has ever been possible. They further be-

[18] A. H. Sturtevant, "The North American Species of Drosophila," pp. 121, 122. Washington: Carnegie Institution, 1921.

lieve that the general tendency of the variations which have occurred have been downward rather than upward, in the direction of degeneration instead of in the direction of improvement, though of course in some instances it may not be possible to evaluate the change and say that it has been in either direction.

In this the beginning of the fifth decade of the twentieth century we may sum up the proved results of genetics as follows:

1. *Acquired characters* are due to the effects of environment, in the widest meaning of the latter term. They represent the most common form of variation, and are often spoken of as the effects of use or disuse, though this is only a part of the picture. Mutilations also come under this head.

The important thing about these "acquired characters" is that they are *not* passed along to the next generation. The blacksmith does not transmit his strong muscles to his children; they have to begin exactly where he himself began.

August Weismann wanted to test out the effects of mutilations; so he cut off the tails of nineteen generations of mice. He might have saved himself the trouble. Because for four thousand years Jewish parents have been circumcising their male children, and sheep herders have been cutting off the tails of their lambs for I don't know how many centuries. But lambs are still born with tails, and Jewish boy babies still have foreskins until the eighth day. As Conklin expresses it, "Wooden legs do not run in families, although wooden heads do." After all the wars and accidents down the centuries, the human race would be a queer-looking lot, if either losses or gains in anatomy or physiology were transmitted to the succeeding generation.

Lamarck based his theory of evolution largely on this idea that acquired characters are accumulated from one generation to another; and this view is often called "Lamarckism." Herbert Spencer was very emphatic in stating: "Either there

has been inheritance of acquired characters, or there has been no evolution."[19] Haeckel was just as positive in stating the same alternative; and Darwin and all the leading evolutionists of that time taught the theory as an important factor in their general scheme of nature.

Today the situation is somewhat like the case for spontaneous generation. It is difficult to prove a universal negative in either case. But if either spontaneous generation or the transmission of acquired characters were true, we would not have to look for the evidence; it would stare at us on every side and in every part of the world. This old world has many disadvantages as it is; but it would not be safe or possible to live long in a world in which either of these conditions prevailed.

As already stated, Lamarck's doctrine was that the effects of use or disuse were automatically passed along to the next generation. But he made it broader than that, for he also included the needs or the desires of animals (surely not plants!), which he declared became registered in the tissues of the organism and then automatically appeared as changes in legs, or neck, or other organs. Thus, he declared, all the changes brought about by the environment effected changes in the structure and the instincts of all the forms of life thus affected.

James Russell Lowell ticked off this theory of Lamarck in some lines in his "Bigelow Papers:"

> "Some filosofers think that a fakkilty's granted
> The minnit it's felt to be thoroughly wanted,
>
> • • • • •
>
> That the fears of a monkey whose holt chanced to fail
> Drawed the vertibry out to a prehensile tail."

[19] Quoted by J. A. Thomson in "Heredity," pp. 194, 195. London: John Murray, 1919.

Charles Darwin's grandfather taught essentially the same nonsense in his doggerel verses which were being published about the same time as Lamarck's writings; and although Charles Darwin repudiated the *wishing* of animals as a factor in evolution, almost the last things he wrote in letters to some friends defended the effects of use and disuse as probably effective in producing changes in the following generations; and his hypothesis of "pangenesis" was an attempt to explain just *how* this transmission of acquired characters is effected.

Not long after Darwin's death, August Weismann (1834-1914) began his campaign against any and all forms of Lamarckism by his stress on the distinctness of the germ cells (ova and sperms) from the ordinary vicissitudes of the body. He pointed out that in both the male and the female the germ cells are set apart almost from the very first stages as a sort of cellular aristocracy, distinct from all the other cells of the body, and thereafter take no part in the physiologic processes of the body cells (called somatic cells). These germ cells, passing along from one generation to another without being influenced by any of the vicissitudes of the changing environment, Weismann spoke of as a permanent or continuous stream of germ plasm, though the latter term must not be taken too literally.

For those who have not studied these matters, the shift of emphasis from the body to the germ cells may seem strange, may even seem like an attempt to make the tail wag the dog; but there is sound anatomy and physiology in Weismann's main contention that the germ cells, both male and female, are essentially unaffected by what the body goes through. It may sound whimsical to say with Edwin Grant Conklin that "the hen does not produce the egg, but the egg produces the hen and also other eggs,"[20] or with Samuel Butler, "A hen is only

[20] Edwin Grant Conklin, "Heredity and Environment," p. 125. Princeton University Press, 1930.

an egg's way of producing another egg."[21] But all subsequent study and experimentation have proved that Weismann was essentially right in his repudiation of the Lamarckian doctrine that the effects of environment are passed along to the next generation.

When Mendelism was brought to the attention of the scientific world in 1900, the laws thereby established renewed the attack on the inheritance of acquired characters. Not only are the germ cells the carriers of heredity; but the nucleus of the cell is now seen to be the important part; inside the nucleus are the chromosomes, and in the chromosomes are the (invisible) "genes," which are now spoken of as the all-important carriers of all hereditary characters. And thus Mendelism and its corollary, modern genetics, have sounded the death knell of the Lamarckian doctrine of the transmission of acquired characters, though a few belated old-timers, like E. W. MacBride of London, are still frantically contending that all *other* methods of explaining the "causes" of organic evolution have failed, and *therefore* the effects of habits on the organism must become instrumental in shaping the following generations. Such are the tactics of a theory when it has been cornered and has its back to the wall, with all the facts now against it and appearing as its enemies.

A number of years ago, Professor Johannsen of Denmark, by his careful experiments with a well-recognized species of beans, was able to isolate nineteen different kinds of what he termed "pure lines." The progeny of each individual was kept separate from all the others by careful records; and he found that each of these "pure lines" differed from all the others in certain well-defined respects. The selection which he worked upon them did not create these lines, it only sorted out of the species these pure lines or *homozygotes* which already existed.

[21] Quoted by Charles Singer, "The Story of Living Things," p. 545. New York: Harper & Brothers, 1931.

By further work he found that when he propagated extremely small or uncommonly large individuals from any of his pure lines, none of the descendants kept on as smaller or larger than the ordinary; they merely fluctuated between the original extremes shown by that particular pure line. He concluded that, when a pure line is once found, all further selection within that line is absolutely without any effect in modifying in the slightest any of the characters in the offspring of that line. By selection we can isolate homozygous individuals from a mixed population; but no kind of selection, either experimental or "natural," can originate any new mutations; it only sorts out latent stocks which all the time were originally there, and when these are isolated, nothing more can be done about it, except to maintain the level thus brought to light.

2. The second form of variation is *recombination.* This is due to some realignment of characters already present in the ancestry, but involves nothing really new. Mendelism has shown how some characters are recessive, and exist though latent through several generations, coming into visibility as the result of some new combinations.

Hereford cattle are red, with white faces; Aberdeen Angus cattle are all black. When they are crossed, the offspring are black with white faces. Nothing strictly new is shown here, though the combination is new. Modern books on Mendelism are full of the remarkable and interesting results which may be brought about in this way. Many "improved" varieties of domesticated plants and animals have been developed in this manner.

Whether any frequent or extensive crossing of races or "species" has taken place in nature or is now going on, is a moot question.

3. The third form of variation may be called *chromosomal aberration.* Cases of this sort, when the chromosomes are examined under the microscope, show something abnormal

about them in either size, arrangement, or number. Certain strains of roses and other plants have one and one-half times, while others have twice, the number of chromosomes present in the vegetative cells of the parents, and so are called *triploids* and *tetraploids*, respectively. Most cases of this sort also show some freakishness of the outward form, also probably an unbalance of the physiological functions. Abnormal size may also appear in this way, though this increased size may not always be accompanied by an increase in general vigor.

This form of variation has been studied much more among plants than among animals, and its facts and meanings are still under discussion; for the full results have probably not yet been worked out.

There is little evidence that any *upward* progress in either plants or animals could be attained by chromosomal aberrations. The available evidence tends to show that the results are rather downward, or in the direction of degeneration. Sometimes, however, they may be neutral, so far as the viability is concerned.

4. The fourth in this list of variations goes under the rather blanket name of *mutations*. Some entirely new character appears which has not before been observed in the ancestry. It has not been due to a response to environment, unless the survival from the harmful effects of chemicals, or some form of radiation, such as X rays, ultraviolet rays, or cosmic rays, may be thus classified. But when mutations do occur, they are duly transmitted to the next generation according to the ordinary laws of Mendelian heredity, either as recessives or as dominants. In most regular mutations no visible change in the chromosomes has been detected; hence we cannot be sure that a corresponding chromosomal change has taken place; but something of the sort seems to be indicated.

Usually, though not always, true mutations are recessive when bred with the standard or wild type. This makes it

unlikely that they would tend to establish a new form in the natural state.

Mutations are normally very infrequent, long lapses of very many generations passing without any such new forms arising. However, Morgan and his associates have seen more than 500 such mutations arise in pedigree cultures; and almost every organ of the body of *Drosophila* appears to have been changed in one way or another. Some of these changes are merely curious, and without any visible harmful effect upon the viability of the succeeding generations. But not a single new kind thus produced can be spoken of as showing any improvement or advancement in the fly's organization. The vast majority of these new forms are just pathologic freaks, which could not possibly survive in nature if left to themselves.

The other kinds of animals and plants which have been similarly bred for the study of mutations confirm the results worked out with the fruit fly, though the latter has proved far more susceptible to change than others. But it is a pathetic picture which we get from all these pathologic freaks which have developed under the breeding experiments of the most expert technicians in the world. It is pathetic; but it is also very enlightening, so far as the old theories of Darwin and the other evolutionists are concerned.

E. W. MacBride may be regarded as somewhat intemperate in his condemnation of mutations as the origin of change in nature; nevertheless it is well to record his testimony, for he has long been regarded as one of the most eminent biologists of the entire world:

"Beneficent mutations which could survive in the struggle for existence are figments of the imagination."[22]

Why is it necessary for me to stress the point that all

[22] *Nature*, August 28, 1937, p. 350.

this is most devastating as evidence against the theories which have been taught for well on toward a century in the name of organic evolution?

VII

Probably the most talked-about book on evolution within many years is "Genetics and the Origin of Species," by Theodosius Dobzhansky, recently appointed professor of genetics in Columbia University, New York. The second edition is dated September, 1939. The author is candid, judicial, and hews to a line with the chips falling any way they will.

As already pointed out, the work of Darwin and his followers tended to obliterate the boundary lines between what had been regarded as discrete groups, namely, natural "species." In the eyes of the Darwinists, "races" (geographical or otherwise) were only incipient or beginning "species;" the latter was a very unstable affair, and had little or no excuse for existence; all organic nature was (according to them) in a state of perpetual flux.

Dobzhansky reviews the whole subject of classification, and shows how all the larger groups, phyla, classes, orders, and genera, are more or less artificial, and mere matters of convenience as mental pigeonholes. But *species are genuine groups made by nature itself;* and although a species may be capable of subdivision into local races, the species as aimed at by Linnaeus is nevertheless a real entity, and must be taken into account in any scheme of attempting to account for the origin of living things. I quote from his final chapter:

"There is, however, a single systematic category which, in contrast to others, has withstood all the changes in the nomenclature with an amazing tenacity. This is the category of species. To be sure, some of the species described by Linnaeus have been split into two or more new ones, and such splitting of species is in general not infrequent. And yet, a majority of the Linnaean species

still are treated as species, not as subgenera, genera, or anything else."[23]

He then speaks of the "difficult" groups, like the willows, the asters, or the genus *Rubus,* to which the blackberries and raspberries belong. And he proceeds to say:

"The situation encountered in these difficult groups is apt to convey the false impression that species in general are arbitrary units like the rest of the systematic categories. Some biologists, lacking familiarity with the subject, have, in fact, fallen into this error. In reality, no category is arbitrary so long as its limits are made to coincide with those of the discontinuously varying arrays of living forms."[24]

If genetical tests are applied to determine "species," slight or minor adjustments of the boundaries between the various groups may be necessary; but in general the species as determined under modern tests will "largely coincide" with those already fixed by systematics or classificationists.[25] He adds:

"Therefore, there is no doubt that our definition of species refers to a real and important phenomenon in nature. If this phenomenon cannot be called 'species,' it must be called something else, and a new term should be invented for this purpose."[26]

Dobzhansky thinks that new forms may arise by mutation, or by any one of the various forms of chromosomal aberrations; but these can occur only very infrequently, and always affect only one character at a time, whereas species differ from one another not in one character, but in many. And any mutation or chromosomal change which may occur could not possibly bring about a sufficient amount of change to make a new species all at one jump. Hence he declares:

"Mutation changes one gene at a time; simultaneous mutation of

[23] Theodosius Dobzhansky, "Genetics and the Origin of Species," p. 306. New York: Columbia University Press, 1937.
[24] Id., pp. 306, 307.
[25] Id., p. 316.
[26] Id., p. 313.

masses of genes is unknown. On the other hand, species differ from each other usually in many genes; hence, a sudden origin of a species by mutation, in one thrust, would demand a simultaneous mutation of numerous genes. Assuming that two species differ in only one hundred genes, and taking the mutation rate of individual genes to be as high as 1:10,000 [that is, once in ten thousand successive generations], the probability of a sudden origin of a new species would be 1 to $10{,}000^{100}$."[27]

For my nonmathematical readers I may explain this latter term as meaning ten with 400 ciphers after it—a number far greater than the number of atoms in the visible universe. When the chances are one to such an inconceivable number, we may well rate it as utterly impossible. The six monkeys which Huxley once spoke of as being turned loose to jump up and down on as many typewriter keyboards, would be about as likely to pound out all the books in the Library of Congress by their hit-and-miss performances, as mutations and chromosomal changes would be likely to produce a new species at one jump. In fact, Dobzhansky himself declares that "the sudden origin of a new species by gene mutation is an impossibility in practice."[28]

As by far the larger number of mutations are harmful to the organism, many even lethal, or deadly, so chromosomal aberrations are also often harmful or even lethal. A very few, however, seem to result in new kinds which are apparently stable and self-perpetuating, such as the artificial cross between the radish and the cabbage, already mentioned. Nevertheless Dobzhansky makes the following admission:

"There seems to be no doubt that the disturbances in the chromosomal mechanism inherent in autopolyploidy reduce in general its usefulness as an evolutionary method."[29]

It is among plants that this phenomenon of polyploidy, or increasing the number of chromosomes, has been observed or

[27] Id., p. 40.
[28] Id., p. 192.
[29] Id., p. 200.

has been produced; it is essentially unknown among animals. For many "rather extraordinary circumstances" "must occur in order that nature may connive at the development of polyploidy in animals that normally reproduce bisexually."[30] When such do occur, they "develop into strange creatures." And he goes on to say:

> "The interracial hybridization, even if it sometimes occurs in nature, is unable to give rise to a viable hybrid form that could compete with the parental races."[31]

Dobzhansky's long suit is in shifting the action of natural selection from the individuals to populations; and he thinks that in the long run the populations must adjust themselves to their environment, which may be sufficient to bring about an evolutionary change of more or less significance. And yet, in spite of all that may be said for all these possibilities of change, Dobzhansky admits:

> "The number of generations, and consequently the amount of time needed for the change, may, however, be so tremendous that the efficiency of selection alone as an evolutionary agent may be open to doubt, and this even if time on a geological scale is provided."[32]

The significance of this latter phrase is that, in the minds of some people, almost any unreasonable or impossible thing may be supposed to happen in a thousand million years. And yet it is not fair to call a scientific theory any more reasonable when it takes shelter under the smoke screen of geological time stretched out to such unimaginable lengths.

But even then, Dobzhansky seems to have doubts about any mutational scheme's being sufficient to account for—not the mere origin of a few species, but—the evolution of an amoeba into a man or an elephant. And he says:

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[30] Id., p. 223.
[31] Ibid.
[32] Id., p. 178.

"Whether the combined forces of mutation and selection are sufficient for a sustained progressive evolution is, nevertheless, not immediately clear."[33]

I should say it is "not immediately clear." On the contrary, the more we really look into the details of this scheme of organic development from the protozoans or unicellular forms up through the fishes, reptiles, and mammals to men and elephants, the more preposterous the whole thing appears to be.

And it is accomplishing something when modern biologists, by sheer study of the facts, even under the hypnotic suggestion of Darwinism all along the line, have at long last arrived within sight of the end of their blind alley, and see that they have been working out an utterly preposterous and impossible theory as a substitute for the sublime record of Genesis.

VIII

Species have been classified largely upon outward appearance. But there is also the fact that most species are cross sterile between one another, or if they do cross or are artificially made to cross, their progeny is usually sterile. This fact of cross sterility has always been made use of as an important test of the boundary lines between species. But more recently the results of chromosomal studies have been made use of to determine what is a true species. Some careful examination of the chromosomes of two species of fruit flies, *Drosophila pseudoobscura* and *D. miranda,* will help in understanding these matters. For the differences between these two species is typical of the differences between many other closely related species, which though quite similar in outward appearance, yet differ fundamentally in the make-up of their cells.

[33] Id., p. 179.

By a careful microscopic examination of these two species, it has been found that their chromosomes differ in the arrangement of the component parts of the long, ribbonlike bands (chromosomes) which always go in pairs in every cell, one of each pair having come from the father and one from the mother of the animal. I mean that the chromosomes of one of the species mentioned above are visibly and physically different from those of the other. Hence when these two species are crossed, although they seem in appearance much alike, the pairs of chromosomes produced by the hybridization do not match up against each other. The result is usually an offspring which fails to live.

Most species of *Drosophila* have four pairs of chromosomes, though some have five and some six pairs. In the case of the two species mentioned above, though each has four pairs of chromosomes, the sets differ from each other in the linear arrangement of their "genes" in at least 49 places. Probably twice this number is nearer the true situation.[34] These many and profound differences between their chromosomes make it difficult or impossible for them to unite or pair up properly at conjugation or at the many subsequent cell divisions. For the chromosomes from the one parent must always pair up with those from the other parent, not only at the first union of the ovum and the sperm, but at all subsequent cell divisions during the growth and life of the resulting offspring. As all these operations of the cells in dividing for mitosis, or cell division, are extremely delicate and highly specialized operations, there is little wonder that, when the chromosomes from the one of these species try to pair up with those from the other, the result is a very poor fit; and the consequence is a nonviable offspring, or no offspring at all.

This basic difference in chromosomes is a very far-reach-

[34] Id., p. 112.

ing principle, and it explains why crosses between two distinct species, even though outwardly much alike, are usually sterile. In this case of the two species of fruit flies, it seems impossible to imagine how these two species could have descended from any common ancestor. This type of microscopic study of the chromosomes has not been extended to many other cases; but it would seem very reasonable to suppose that similar differences will be found between other species which may appear outwardly much alike.

It is thus clear that the real boundary lines between species may yet have to be based on a study of their chromosomes as well as on outward appearance and the other Linnaean criteria.

IX

Perhaps we are now ready to consider the profoundly important question of what kinds of animals, and how many kinds, were created in the beginning.

The only records (aside from the Bible) are in the rocks in the form of the fossils. But they are not records of the kinds originally created; they are records of those which were buried at the time of the flood, many hundreds of years later. However, they are the only scientific facts we have; and we must make the most of them.

It used to be said that all the fossils belong to "extinct" species. This has turned out to be a fallacy; and yet there are many kinds, such as the dinosaurs, the titanotheres, and the trilobites, which have never been seen alive on earth in modern times, and probably never will be. We can admit that these are really "extinct."

It is evident at the outset that we need to understand something about the classification of the animals. We may leave the plants out of our reckoning. For one thing, the same general principles that we may discover in the case of the animals will probably apply to the plant kingdom. But

it is also true that paleobotanists have never been so much concerned with the theory of evolution in their field; some of them have remarked that fossil botany raises many more problems for evolution than it solves.

All classification is merely an intellectual device for convenience: it helps us to understand relationships between the things which we classify. But it also contains within its very framework our personal opinion, probably more or less inaccurate, of the true relationships between these things. In the case of a classification of the animals of the world, it is based largely upon outward form, though sometimes more on internal anatomy than on externals, as in the case of the mollusks and the brachiopods, which used to be grouped together because their external shells somewhat resemble one another, but now are placed in separate phyla, because their internal structures are so wholly dissimilar.

The animals of the world are divided into a dozen or more phyla, or subkingdoms, which are so distinct from one another that there are no intergrades or intermediates between them, living or fossil. The number of phyla is a matter of personal opinion about relationships which may be interpreted in one way if certain structures are made of paramount importance, or in another way if certain other structures are considered of more importance.

The phyla are divided into classes, the latter into orders, and these into families, which are subdivided into genera and then into species. Along the line there are also subclasses, and suborders, etc., to help out in showing finer and finer degrees of structural "relationship," which usually means genetical relationships in the minds of most modern scientists, or relationships in evolutionary descent.

Fifty years ago the number of phyla was usually listed as eight; today the number is more than that, Austin H. Clark making the number twenty. While not all modern zoologists would agree with Clark in this number, probably almost all

would now make the number of major groups or phyla considerably more than the eight of a half century ago.

In the days of Darwin, some of the more ardent evolutionists used to speak of monophyletic evolution, or the origin of all the animals from one single stock. Today very few careful zoologists or biologists would admit such a scheme as possible, though they usually dislike to discuss the subject. The reason is that these phyla are so distinct from one another, with no intergrades or intermediates, that we just can't visualize how they can possibly be of common descent. Furthermore, in the very "earliest" of the fossiliferous strata, the Cambrian, we find *every one of the phyla, except the vertebrates, represented side by side,* even in the evolutionary arrangements of the rocks. For the proof of this I would refer the reader to any good modern geology which deals with this subject of the "earliest" fossils. The following from James D. Dana is not very "modern," but it is from a very high authority, and the conditions have not changed since it was written (1894):

"The Lower Cambrian species have not the simplicity of structure that would naturally be looked for in the earliest Paleozoic life. They are perfect of their kind, and highly specialized structures. No steps from simple kinds leading up to them have been discovered; no line from protozoans up to corals, echinoderms, or worms, or from either of these groups up to brachiopods, mollusks, trilobites, or other crustaceans. This appearance of abruptness in the introduction of Cambrian life is one of the striking facts made known by geology."[35]

And it still remains "one of the striking facts" about the fossils. Witness the following from Austin H. Clark:

"One of the most striking and important facts which has been established through a study of the fossil animals, is that from the very earliest times, from the very first beginnings of the fossil

[35] James D. Dana, "Manual of Geology," 4th ed., p. 487. New York: American Book Company, 1895.

record, the broader aspects of the animal life upon the earth have remained unchanged."[36]

Again from the same author:

"No matter how far back we go in the fossil record of previous animal life upon the earth, we find no trace of any animal forms which are intermediate between the various major groups or phyla."[37]

Did not Dr. Charles D. Walcott, then president of the Smithsonian Institution, spend some of the best years of his life, summer after summer, trying to find some more "primitive" or simpler forms of life in the Burgess shale in British Columbia? But even in the very "oldest" beds he always found trilobites and other highly organized creatures.

Let me present the inevitable conclusion from these facts by Austin H. Clark himself, who refuses to blink these vastly important but much-overlooked facts:

"Since all our evidence shows that the phyla or major groups of animals have maintained precisely the same relation with each other back to the time when the first evidences of life appear, it is much more logical to assume a continuation of these parallel relationships further back into the indefinite past, to the time of the first beginnings of life, than it is to assume somewhere in early pre-Cambrian times a change in these relationships and a convergence toward a hypothetical common ancestral type from which all were derived. This last assumption has not the slightest evidence to support it. All the evidence indicates the truth of the first assumption."[38]

No wonder this author protests against any further overlooking of these striking facts. He says:

"The complete absence of any intermediate forms between the major groups of animals, which is one of the most striking and

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[36] Austin H. Clark, "The New Evolution," p. 100. Baltimore: The Williams and Wilkins Company, 1930.
[37] Id., p. 189.
[38] Id., p. 104.

most significant phenomena brought out by the study of zoology, has hitherto been overlooked, or at least ignored."[39]

As pointed out above, the phyla are divided into classes, and these into orders. For example, the Pisces (fishes), Amphibia, Reptilia, Aves (birds), and Mammalia are some of the more important of the classes under the subphylum Vertebrata. While the Edentata (sloths, armadillos), Rodentia (rats, beavers), and Carnivora (cats, dogs, seals) are some of the familiar orders under the class Mammalia.

With these facts in mind, we are prepared to understand Clark's remarks about the distinctness between the classes, and almost as sharp a distinctness between the orders. Surely here we are getting down to some highly important facts, for the distinctness between these different groups includes the fossils as well as the living forms. I quote again from Clark:

"The larger phyla or major groups are divided into classes, and as a rule the classes within each major group are entirely distinct from each other and do not intergrade. . . . The distinctness of these classes each from the other is probably of the same nature as the much broader distinctions between the various phyla."[40]

And he extends this distinctness to the orders:

"Within the classes the same phenomenon is again repeated in a less extreme form in the different orders, as is especially seen in the insects, crustaceans, gastropods, and brittle stars."[41]

Even the suborders and the families are also distinct from one another. For instance:

"The whales and seals are always whales and seals, and show little or no approach to any other type of mammal. Similarly, there are no intermediates between turtles and snakes, or between turtles and lizards, all of which are reptiles, or between squid and oysters, though both types are mollusks."[42]

[39] Id., p. 168.
[40] Id., p. 221.
[41] Id., p. 222.
[42] Id., p. 167.

And once more:

"Among the more familiar mammals, the cat and the dog lines are always separate. No forms intermediate between cats and their relatives and dogs and their relatives are known, even though both cats and dogs are collateral members, together with the seals, of the Carnivora."[43]

I feel almost like apologizing for so many quotations all along one line. But I do not know how else to make the point clear to my readers and still be believed. Had I stated the bare facts on my own authority, I feel sure that many readers would have taken it with two or three of the proverbial grains of salt. But I have given testimony that cannot be laughed at, from a man too clear-headed to miss the main point in this whole matter, and too unafraid to avoid telling it.

X

It was clever propaganda on the part of Darwin, Spencer, Haeckel, and Huxley to keep the world milling around with the comparatively trivial question of the origin of "species," when such facts as the absolute distinctness of the phyla, the classes, and the orders were ignored or hushed up. But suppose "species" *in the narrower sense* do arise or have arisen naturally. What of it? Haven't the races of men arisen, if not "naturally," at least since the original creation? Nobody today believes the theory of Agassiz that there are a half-dozen separate "species" of men, and that only the white race was created as recorded in Genesis. Modern scientists may not believe what Paul says about God's having "made of one blood all nations of men for to dwell on all the face of the earth" (Acts 17:26) just *because* Paul says so; but they have been driven to believe it as a fact because of scientific revelations nevertheless.

[43] Id., p. 181.

But the races of mankind strikingly resemble taxonomic species. The Negro, Mongolian, and Caucasian races differ from each other not merely in color, but in a dozen characters, which among animals would result in their classification as distinct species. Thousands of long-recognized "species" rest on less physical distinctions than those which distinguish a Negro from a white man. True, the races of mankind are perfectly fertile *inter se;* but so are many so-called "species." And if the races of mankind were as true to their normal instincts as are the lower animals, there is no doubt that they would shun miscegenation as completely as do the species of animals, which may be induced to cross under abnormal conditions, but, at least in thousands of instances, live to themselves side by side in nature and never mix.

And we have no historic account of how the races of mankind arose unless the Bible record of the confusion of tongues gives us the key. That account speaks only of the differences in language; but it has always seemed to me highly probable that the other racial barriers arose at the same time in some providential way that we do not at present understand. Characters of racial distinctness would work to assist the language barriers in effecting what God's providence had in mind; hence it is possible that they may all have had their origin at this same time.

But the circumstance of a recently desolate earth, and the necessity of having the larger animals scatter abroad from the ark, would naturally lead to the establishment by the God of nature of many new races (now often miscalled "species") among animals and plants, each designedly adapted to specific conditions of place or climate of the postdiluvian earth. There is far too much deism in the common notion that Providence had little or nothing to do with this restocking of the earth after the flood. But if the flood itself cannot be explained wholly in terms of present-day "natural law," I cannot see why the restocking of the earth after the flood must be

thus limited. It is an obvious fact that modern "natural law" is wholly inadequate to account for the origin of the great races of mankind. Then why may we not freely admit the same principle regarding the origin of so many of the geographic races of animals and plants which under Darwinian splitting are now commonly called "species"? Certainly, the origin of new genuine species is not going on in our modern world, so far as we have scientific knowledge.

But what kinds were created in the beginning?

Let us go back to Austin H. Clark's impassable gulf between the different phyla, and almost equal gulfs between the classes and the orders. If the whales have always been whales and the seals always seals, with no intergrades between these groups or between either group and other mammals, there must have been representatives of each of these groups in the beginning. But the whales (including the porpoises) make up the order Cetacea, while the seals are put in the same order as the dogs and cats, the Carnivora. It would seem self-evident that some smaller unit than the "order" is called for here. The next smaller unit is the family. The dogs belong to the family named Canidae, made up of four genera, comprising the true dogs, wolves, foxes, and jackals, but putting the hyenas in a separate family. The latter family is a small one, while the Canidae is a large one, the number of species being variously listed, but probably amounting to several dozen.

The cats (family Felidae) are a more compact group than the dogs, though they include the lions, tigers, leopards, and true "cats." Almost every part of the world has one or more indigenous species of cats, sometimes two or three with common habitats, or at least with habitats that overlap, the different kinds not mixing or interfering with one another in any observable way.

Critical genetic studies, including studies of the chromosomes, have not been carried on with the various members of

any of our larger mammals, as they have been with *Drosophila* and *Lymantria*. Hence we do not know how the long-recognized species of wolves, dogs, foxes, etc., would show up under critical genetic studies. And if anyone were to claim that all the members of the Canidae have descended from a common stock, I would not know how to refute him. Similar remarks might be made about the Felidae, or the cats. Nobody really knows; it is just a case of personal opinion. When it comes to the whales (mentioned above by A. H. Clark), it seems to me that we are in an entirely different field; for they are divided into three suborders and no less than seven families, with anatomical and physiological differences which (it seems to me) utterly preclude any blood relationship. Two families of whales are extinct, and known only as fossils.

I have mentioned these specific cases only as examples. As we shall see presently, Goldschmidt and others are now dwelling on the wonderful stability of the Linnaean species, saying that they are separated from one another by bridgeless gaps or even by abysses, anatomically, physiologically, and in the matter of all their instincts. And I for one have been much impressed by Goldschmidt's line of argument. But it may not be necessary here and now to settle just what were the original breeding units which the Creator set for stocking the world. It is self-evident that He must have provided for *some* such breeding units, which though capable of considerable variation within each unit group, would need to be walled off by a barrier of sterility from breeding or mixing with other groups, so as to avoid utter chaos and confusion.

Whether these original breeding units should be called "species," as Linnaeus thought, or should now be regarded as more like our modern genera or even families, is capable of endless discussion, and cannot be settled here, though some light on the problem may be considered.

XI

As already remarked above, Darwin and his followers always taught that "species" are fluid units, constantly tending to change, and little better than imaginary groups. They are mere halfway stages or temporary stopping places in the perpetual flux of nature; for varieties and races are incipient species, and species, incipient genera and families. Such was the theory.

Two aspects of the Darwinian propaganda in support of their main doctrine should be noticed here. Long ago it was observed that geographic races or subspecies often seem to live side by side without any mixing or interbreeding, thus acting like true species. Accordingly, on these outward appearances, the taxonomic botanists and zoologists who followed Darwin contended that they are genuine "species," and would give them new names, the old specific names thus becoming "genera." In some cases even smaller groups than the races have been found to maintain their identity in nature, breeding true without mixing with surrounding groups, though of course they could be induced to cross, and would produce fertile offspring under human experimentation.

Not alone was confusion thus brought into the study of nature; but by these methods the original tests for valid species based on cross sterility became neglected and almost forgotten. This barrier of cross sterility was always regarded as one of the most important tests of real species. Darwin had declared that the stubborn facts connected with this aspect of the case constitute "one of the greatest obstacles to the general acceptance and progress of the great principle of evolution."[44]

Alfred Russel Wallace had also said:

"One of the greatest, perhaps we may say the greatest, of

[44] Charles Darwin, "The Effects of Cross and Self Fertilization in the Vegetable Kingdom," p. 27. New York: D. Appleton Company, 1877.

all difficulties in the way of accepting the theory of natural selection as the complete explanation of the origin of species, has been the remarkable difference between varieties and species in respect of fertility when crossed. Generally speaking, it may be said that varieties of any one species, however different they may be in external appearance, are perfectly fertile when crossed, and their mongrel offspring are equally fertile when bred among themselves; while distinct species, on the other hand, are usually infertile when crossed, and their hybrid offspring absolutely sterile."[45]

But this greatest of obstacles, as Darwin called it, became obscured and almost forgotten. Under the vogue of splitting up species, with races and varieties elevated to the rank of species, and species elevated to the rank of genera, or perhaps even families, the public became fooled in another way. For the Darwinists could now boast that perfectly fertile crosses have now been made between species or even between genera. Thus what Darwin and Wallace had regarded as one of the greatest obstacles to the spread of evolution, was apparently removed. And in the first flush of excitement under Mendelian genetics, it has been proclaimed to the ends of the earth that this insuperable barrier of cross sterility between species no longer exists.

But within the past year or two a remarkable change has come over the thinking of the biological world in this matter of species. This change may be illustrated by the recent edition of the standard work by Sansome and Philp. In their first edition they had taught the then-accepted views that species are unstable and only transitory stages in the ever-changing flux of nature; but in their second edition they express astonishment at the real stability of species after all. Among many other similar remarks, they say:

"Indeed the most recent work in genetics has shown that the Linnaean species is a more fundamental unit than shown by its

[45] Alfred Russel Wallace, "Darwinism," p. 152. London and New York: Macmillan & Company, 1890.

external characters, its chromosome structure, or gene content. In other words, the evidence from taxonomy, paleontology, morphology, cytology, and genetics agrees in establishing species and higher groups in a natural relationship. But it would appear that although genetics can proceed further in the analysis than other branches, the nature of the stability of the species as a genecological entity is still unknown."[46]

I have already quoted the statement of Dobzhansky, that although the names of the higher categories have changed their meanings very considerably, yet the category of species "has withstood all the changes in the nomenclature with an amazing tenacity."[47] He also states that the definition of species as representing a state of fixation of characters "refers to a real and important phenomenon in nature," and that "if this phenomenon cannot be called 'species' it must be called something else, and a new term should be invented for the purpose."[48]

As a matter of fact, a new term has been introduced and has become quite widely used among animal taxonomists, though less widely used among botanists. This term is *rassenkreis* (plural, *rassenkreise*), meaning a circle of races or a large species. It is a return to the older use of the term "species," about as it was used by Linnaeus and all the founders of the biological sciences, and by hundreds of eminent naturalists since then, including the illustrious William Bateson. As this term is now used, the *rassenkreise* (species) are no longer hazy, ill-defined groups; they are "clearly defined, are natural units. There are no transitions from one *rassenkreis* to the other."[49]

Goldschmidt himself goes on to state:

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[46] F. W. Sansome and J. Philp, "Recent Advances in Plant Genetics," 2d ed., p. 347. Philadelphia: The Blakiston Company, 1939.

[47] Theodosius Dobzhansky, "Genetics and the Origin of Species," p. 306. New York: Columbia University Press, 1937.

[48] Id., p. 313.

[49] B. Rensch, quoted by Richard Goldschmidt in "The Material Basis of Evolution," p. 29. Yale University Press, 1940.

"The principle of *rassenkreise* as the natural taxonomic unit has conquered taxonomy and largely replaced the other species concepts."[50]

When looked at in a large way, species are now no longer hazy, indefinite groups, with wide penumbrae and indefinable boundaries. They are definite, natural groups; they do not blend with one another; they never interbreed in wild nature, and if by human manipulation they are crossed, their progeny (if any) is sterile. Thus there are no possible hybrid species arising between them; for they do not form self-perpetuating hybrids either naturally or artificially.

Thus it is clear that, as the result of modern study and experimentation, the foremost men of science are returning to the former idea of there being natural, self-perpetuating groups of plants and animals, which though capable of variation within themselves, are nevertheless stable groups, and do not mix with other groups.

In the first half of his recent book Goldschmidt gives a very careful and conclusive argument that the large species, as spoken of above, are stable groups which do not interbreed; and that varieties and races do not develop into species, but that it is just the other way around—the true or valid species come first, and afterward break up or differentiate into races, varieties, and the other smaller groups.

Goldschmidt uses the term "microevolution" to cover all the processes of variation and change which may go on within the boundaries of the true species. And he says:

"Microevolution does not lead beyond the confines of the species, and the typical products of microevolution, the geographic races, are not incipient species. There is no such category as incipient species."[51]

I may be allowed to present one more statement from this

[50] Ibid.
[51] Id., p. 396.

same author, who is universally acknowledged to be one of the most outstanding men in this field.

"Subspecies are actually, therefore, neither incipient species nor models for the origin of species. They are more or less diversified blind alleys within the subspecies."[52]

As I have already stated, the Creator must have planned for some units of plant and animal life which would continue to breed true down through the centuries and millenniums, if the living world was to be kept from absolute chaos and confusion. For promiscuous crossing could result in nothing but a mass of freaks and monstrosities. And if Darwin's theory were true, the same results would have followed, and at least the fossil world ought to show us innumerable transition types between all the kinds which now seem distinct. But modern research is now proving that these nightmares of confusion are all wrong. There is plenty of variation within definite groups. But the original breeding units of creation are still as always reproducing only "after their kind."

Thus after nearly a century of muddlement under the evil hypnotism of Darwinism, the scientific world has at long last become convinced that varieties are *not* incipient species; the latter are in no proper sense "fluid units," as the evolutionists have been teaching us. And if all this does not constitute a vindication of Genesis, in this particular department of biology which has for so long been considered all-important, I cannot imagine how the Genesis record could be vindicated.

XII

Let us give a summary of this somewhat too long chapter:

1. The fossils have been manipulated for the deliberate purpose of helping to "prove" the evolution of all the various

[52] Id., p. 183.

groups of plants and animals. But this reasoning in a circle has no scientific value, and can prove nothing.

2. Mendelian genetics does not help us in the least in understanding how the breeding units of nature could have originated in the first place. There are no known processes now going on which will explain their origin.

3. The great groups or phyla are so distinctly different from one another that we cannot imagine how any one of them could have been derived from any other, or how any two of them could have sprung from a common ancestor. The same is true in a lessening degree with regard to the classes, orders, suborders, and families.

4. Regarding the species, the workers with *Drosophila* have found units which, though seemingly much alike, do not crossbreed in nature, and cannot be induced to do so in the laboratory. Goldschmidt has found the same condition among the moths (*Lymantria*), species which do not interbreed and cannot be made to do so in the laboratory. In every other group which has been studied with sufficient intensity and critical precision, the same phenomena appear.

5. Hence there are natural units among the living things of nature which breed true within themselves, but are cross sterile with all other units. These may not always correspond to what have been called "species" among those under the spell of Darwinian theories and methods; but these natural breeding units, whatever we call them, are obviously now, as originally, breeding only "after their kind."

And all this seems to be a wonderful confirmation of the Genesis record.

CHAPTER SEVEN

The Ancient Records

I

A HUNDRED years ago Botta, Layard, and Rawlinson were showing the world how to recover our long-lost knowledge of the cities of Nineveh, Babylon, and the other centers of population in the Near East. By most painstaking effort on the part of many scholars in various countries, the Rosetta stone and the Behistun rock furnished the keys to the reading of the hieroglyphics of Egypt and the many tons of tablets since recovered from the Tigro-Euphrates valley and adjacent lands.

These studies in archeology have contributed invaluable evidences in support of much of the history of Genesis and other parts of the Old Testament. But I must leave to others the intriguing story of how these excavations were made, and how the documents from the dust heaps of forgotten millenniums were decoded and have confirmed as genuine history many statements in the Bible which the "critics" by their pseudo scholarship had sneered at as incredible and impossible.

For we have much older records than anything made in the days of Moses or Abraham and Hammurabi. The very marble slabs with which the Great Pyramid was incased from top to bottom contain embedded in them the indisputable fossil relics of creatures which were swimming around in

the ocean waters long before kings were thought of in either Egypt or Babylonia. The Sphinx also, carved out of the rock *in situ,* has fossil nummulite shells sticking out all over its surface, which are nicknamed "Pharaoh's beans" by the Arabs, but are similar to creatures which still live in the deep waters of the Atlantic and other oceans.

But every great mountain range on earth, without exception—the Alps, the Rockies, the Andes, the Himalayas, and all the rest—is composed in large part of rocks which contain shells and relics of other forms of life that must have lived in the ocean and must have been buried by moving water at some time in the long ago. These records are obviously much older than any human carvings found in Egypt or Babylonia. Evolutionists put them back many millions of years, while flood geologists assign their making to the time of the flood. It will be the object of this chapter to present some of the evidence in favor of a world catastrophe of some sort, the scientific counterpart of the Biblical record of the flood, whereas in the next chapter will be presented the arguments against the popular method of arranging these fossiliferous deposits in an alleged chronological order, and in favor of the idea that these various fossils lived contemporaneously in the same world and were overwhelmed and buried by the same general world catastrophe of the universal deluge.

The full evidence for both these ideas is scattered through over a dozen books written by the present author. Here the case will be presented only in bare outline and in semipopular form; the more formal and technical arguments will be found in the author's two works, "Evolutionary Geology,"[1] written for professional geologists, and "The New Geology,"[2] a college textbook.

[1] Mountain View, Calif.: Pacific Press, 1926.
[2] Mountain View, Calif.: Pacific Press, 1923.

II

Anyone who has traveled around over the earth with his eyes open has seen multiplied evidences that the lands have emerged from under the waters of the oceans (or that the oceans have retreated from off the lands, which is the same thing), and that this took place not so very long ago. In northwestern Europe and northeastern America the surface materials have been mussed up by ice or by the storms at the close of the deluge, so that the surface record is not so clear as in other parts of the world. But in general, or, for instance, along the eastern base of the Rockies in the vicinity of Colorado and Wyoming, a full mile above sea level, the marks of the water are very clear and unmistakable; for this region was at that time the shore of the retreating ocean which still filled all the Mississippi Valley. Similar old shore lines are to be found in all parts of the world.

W. J. Sollas, of Oxford University, has pointed out that the rivers of Western Europe, such as the Rhine, the Moselle, the Garonne, and the Loire, have each four old river terraces, the highest being at about 300 feet, and that these river terraces when traced down to the ocean blend with old shore lines around the coast, and that similar conditions occur in other rivers around the Mediterranean.

I quote from Sollas:

"At the same time the four ancient coast lines observed at the mouth of the Rhone and the Isser have been traced around the greater part of the Mediterranean and along the western shores of the North Atlantic Ocean.

"We are therefore justified in asserting as a general truth that the four great river terraces are associated with corresponding coast lines which maintain the same level as the seaward termination of the terraces themselves.

"This is a fact of first-rate importance, for it is the position of the mouth of a river which determines the development of its terraces: hence the four terraces owe their position not, as has been

supposed, to the ancient glaciers, but to the height of the sea level at the time they were in process of formation."[3]

This last statement is very important. These river terraces represent the height of the sea level at the time when they were being formed. They were not formed by four successive continental glaciers, as is so widely taught. And the same principle holds good all over the world, for similar high river terraces are to be found in all parts of the globe.

In a subsequent report to *Nature*[4] this same author says that five well-marked terraces have been traced along the banks of the Euphrates, which flows into the Persian Gulf and thence into the Indian Ocean. Of these five terraces on the Euphrates, the second, third, and fourth are at almost precisely the same height above sea level as the similarly located ones on the rivers flowing into the Mediterranean and the Atlantic. The first and the fifth do not so closely correspond. But it is surely interesting to note three distinct marks in regions so widely separated, which represent the shore of the ocean as it stood briefly while the lands were emerging from the ocean.

In Egypt the sides of the Nile Valley show several terraces, which also appear around the oasis of the Fayum to the west of the lower Nile region. The highest, or oldest, of these terraces represents the time when the Nile and its branches were flowing at the high level of the present desert plateau. The four uppermost terraces, which were doubtless formed in somewhat rapid order and soon after the flood, show no traces of human occupation. The fifth terrace (in descending order) has yielded many well-worked flint implements, while the sixth or lowest of the series represents a time when the lake filled most of the Fayum valley. Other less

[3] W. J. Sollas, "Ancient Hunters," pp. 31-33. London: Macmillan and Company, 1924.
[4] Nov. 13, 1926, p. 692.

well-marked terraces come farther down, and represent the time of the earliest rule of the Pharaohs.[5]

I am not aware that this subject of correlating the high river terraces with the old strand lines which encircle all the continents, has been studied in any adequate way. Probably it is not a very interesting topic to evolutionary geologists. For these terraces are too obviously proofs of the time not so very long ago when the ocean waters "stood above the mountains." Ps. 104:6.

One fifth of the entire land surface of the globe is occupied by what are called interior basins, with interior drainage and either no exterior outlet or only an ineffective one. All of these interior basins are ringed around high on the mountainside by old shore lines still clearly visible, which represent the places at which the waters once stood. For example, on the mountains of Utah are old beaches a thousand feet above the present level of Great Salt Lake. Similar conditions are found all over the globe. The highest shore lines in each case would represent the time when the basin was left full of water at the retreat of the ocean from off the continents; and there is nothing to hinder us from picturing *all* of these great interior basins as having been full to the brim *simultaneously,* at the close of the flood. This condition of affairs, as we shall see in a subsequent chapter, could not fail to have a very profound effect upon the climate of the entire globe for a considerable period following the flood.

III

The evolutionary geologists have regaled us with plausible stories that the coasts of all the continents are still on the seesaw up and down, rising in some places and subsiding in

[5] See *Science News Letter,* May 3, 1930, p. 281, review of a recent work by K. S. Sanford and W. J. Arkell, Chicago University Press.

others; and it is only by extending backward into the past this supposed unsteady condition of what they call the "pulsating crust" that they can make at all reasonable their theory that the lands have been down and up hundreds of times in the past, thus seeming to account for the alternation of land forms and sea life which we find everywhere in the strata of all the continents.

But modern research has shown that this is a wrong picture entirely; for the present level of the ocean has been maintained for a time sufficient for the formation of a continental shelf, as it is called, around all the lands of the globe.

And in the words of a recent writer:

"The uniform levels of the continental shelves suggest that there has been a long period of stability since any great uplifts and sinkings such as may account for high terraces and deep submarine valleys."[6]

Douglas Johnson, of Columbia University, editor of the *Journal of Geomorphology,* has long been critical of the alleged evidence for any modern up-and-down movement of the continents. In a paper a few years ago he wrote as follows:

"In the course of researches on the supposed progressive subsidence of the Atlantic coast it has been discovered that many of the apparent changes of level were, in fact, caused by local fluctuations of the high-tide surface due to changes in the form of the shore line. As low-tide levels are likewise known to vary with variations in the form of the shore, but as a given shore change does not necessarily produce equal or equivalent changes in the high-tide and low-tide levels, the question arises as to whether mean sea level itself may not change with changes in the form of the shore. . . .

"Many of the supposed proofs of a recent and continued subsidence of the Atlantic coast of North America can be interpreted as due to local fluctuations of high-tide level amounting in cases to as much as several feet. . . .

[6] F. P. Shepard in *Science,* Nov. 8, 1933, pp. 407, 408.

"At present all arguments for changes of relative level of land and sea based on observed changes of mean sea level are open to suspicion."[7]

Among modern works on geology probably most students of the science would assign the first place to the monumental four-volume work of Eduard Suess, "The Face of the Earth." One of the chief aims of this work was to canvass all present-day geological processes and compare them with the records of the past, and to decide *how* the ancient fossiliferous strata were produced. Suess's conclusion is that modern geological processes are *not* adequate to explain the past. Dozens of statements to this effect might be adduced from these volumes. Several more are given in my "Evolutionary Geology," pages 326-328.

The following will suffice here:

"The theory of the secular [extending over a long period] oscillations of the continents is not competent to explain the repeated inundation and emergence of the land."[8]

Again, speaking of such places as Sweden and Greenland, which have been spoken of as now rising or falling, Suess says:

"Displacements susceptible of measurement have not occurred within the historic period."[9]

Also:

"Thus, as our knowledge becomes more exact, the less are we able to entertain those theories which are generally offered in explanation of the repeated inundation and emergence of the continents."[10]

That all the continents must have been inundated *repeatedly,* as this quotation implies, if the evolution theory is true, may be illustrated from the coal beds. In most of the

[7] *Science*, Jan. 7, 1927, p. 4.
[8] Eduard Suess, "The Face of the Earth," Vol. II, p. 540. Oxford University Press, 1904-09.
[9] Id., p. 497.
[10] Id., p. 295.

coal regions of the world there are from 75 to 100 or more successive seams of coal, one above another, little and big, with a much larger number of other materials alternating with them which have clearly come from—not the shallow coastal waters—but the *deeper* parts of the ocean bed. Strata of crinoids or brachiopods are very frequently found thus in alternation with the coals; and essentially all the crinoids and brachiopods now living are inhabitants of the deeper parts of the ocean. Common sense tells us that the vegetation forming the coals did *not* grow where we find it, or *in situ;* it must have been brought into this position by the waters, for it is just as much a sedimentary deposit as are the sands, clays, and limestones with which it is found alternating.

But on the peat-bog theory of the origin of coal, the lands over very wide areas must time and again have been delicately poised just about so far above the sea level, to allow peat bogs to form and not be too well drained; but every bed of crinoidal limestone means a submergence to the depths of the ocean. But in spite of all this repeated up-and-down movement, the alternating beds were always kept *parallel to one another over very wide areas;* hence they must have been kept very accurately horizontal as they went up and down, with the same care with which a waiter carries a full plate of soup. And all this must have been *repeated dozens and scores of times* in each locality. The absurdity and incredibility of this whole scheme is further emphasized by the modern testimony of such high authorities as Eduard Suess and Douglas Johnson that no such rise and fall of the coasts is now going on in our modern world.

Further details about the formation of coal will be found in "The New Geology," pages 454-470. Here it should be noted that the geologists of Continental Europe have never accepted the peat-bog theory, but teach that the coals are true sedimentary deposits.

The transportation of the vegetable matter by water is far more reasonable than the commonly taught peat-bog theory of growth *in situ*.

The following from E. C. Jeffrey, of the botanical department of Harvard, is contained in a book review of a German work, but shows that even some excellent American botanists do not accept the peat-bog theory:

"It is of interest to note in this connection the author's open-mindedness which becomes apparent in his remarks in regard to Tertiary brown coal. He pointedly asserts that it is no longer possible to regard the brown-coal deposits of the Northern Hemisphere as derived from formations comparable with the Dismal Swamp of America. This point of view is refreshing in relation to the extremely reactionary attitude of the mass of American geologists in regard to recent investigations on coal. One wonders if the United States will have the undesirable pre-eminence of being the last country to adhere to the *in situ* hypothesis of the origin of coal, just as it was the last country to adhere to the seed-bearing character of arboreal cryptogams, such as the Lepidodendrids and Calamites. It has been wittily remarked that Oxford is the place where good German theories go when they die. As far as palaeobotany is concerned, the United States appears at the present time to rival that ancient institution of learning."[11]

H. T. de la Beche, the first head of the Geological Survey of Great Britain, which was organized in 1835, did not agree with the uniformitarian theories of Charles Lyell, then coming into public notice. De la Beche, in his thoughtful book, "Researches in Theoretical Geology," assumes that much, at least, of the geological work as recorded in the rocks must have been of a violent and catastrophic character, much after the nature of what fundamentalists claim for the flood. For instance, he points out that if a portion of the sea bottom were elevated, the waters—

"would necessarily be agitated with more or less violence in pro-

[11] *Science*, Oct. 3, 1930, p. 345.

portion to the sudden elevation, volume, and height of the upheaved and dislocated mass."[12]

But while innumerable animals and plants seem to have suffered violent deaths as the result of very abnormal action of the waters, there is also abundant physical evidence from the sand and silt now consolidated into rock in all parts of the world that there must have been an enormous amount of somewhat quiet action of the waters of the flood. De la Beche explains how this could be under the action of ebb tide:

"Those who have seen the tide leave the shore on shallow coasts, and witnessed the rapidity with which large tracts of slightly inclined sands or mud become freed from water, pools here and there appearing, will readily conceive that a rise of bottom, producing as rapid a disappearance of water, would entirely prevent the great mass of molluscous creatures, and even some fish, from escaping. Yet the disappearance of the water would be so gradual that the surface [of the land] would no more be torn away than is the case when the tide ebbs on shallow coasts. In all probability a much quicker disappearance of water might take place and yet the bottom remain firm."[13]

He proceeds to explain that, while the incoming of the tide is so rapid in some instances on a shallow coast that one may require the help of a good horse to get to dry land in safety, *the ebb of the tide must be equally swift,* though it is not so well appreciated, because it is not attended by a similar danger, except to the marine animals which may be left stranded on the tide flats. All these facts help to explain how there could be a wide destruction of plant and animal life, and the burial of myriads of forms in the sediments, while at the same time the strata often seem to have been deposited without undue violence, and such delicate substances as leaves and pollen grains have been preserved in all their original perfection of form.

[12] H. T. de la Beche, "Researches in Theoretical Geology," p. 174. London: Charles Knight, 1834.
[13] Id., pp. 247, 248.

IV

But before we go on to consider the more positive evidences from the fossils that they were destroyed and buried in some very abnormal manner, something very different from the processes going on in our modern world, we need to have as a mental background a knowledge of the dead calm which reigns eternally at the bottoms of our present oceans, indeed in all parts of the oceans below a few hundred feet of the surface. The waves and currents may agitate the waters at the top, and their effects may extend down to a depth of perhaps five or six hundred feet. But from there on down to the depths of the ocean, one, two, three, four, or even five miles down, the most fragile ooze lies in eternal calm, with no agitation of the waters to disturb it. This is now so well established by the studies in oceanography that there is no need to quote testimony.

Accordingly, while the earlier geologists always pictured the bottom of the ocean as being made up of beds of sand and clay alternating with organic deposits, which on being elevated to the position of dry land would make stratified rocks similar to those now composing all the continents, we now know that this is all wrong. At the bottom of the oceans, indeed in all the deep waters below a thousand feet or so, there cannot be any real alternating beds of clay and sand and gravel. Thus when we look at the ordinary stratified beds of any of the continents, with their regular alternations of such fossils as crinoids and brachiopods, which in our modern world live only in the deep, calm, clear waters, alternating with land fossils, such as coal beds and land mollusks, to say nothing of coarse sand and gravel—when we see these alternations, we realize that we are looking at something so wholly abnormal that nothing of the sort is now being made in any part of the world.

Plenty of reluctant admissions might be adduced, but two

must suffice. The first will be from Sir Archibald Geikie, for a long time the head of the British Geological Survey:

"Thanks to the great work done by the 'Challenger' and other national expeditions, we have learnt what are the leading characters of the accumulations now forming on the deeper parts of the ocean floor. So far as we know, they have no analogues among the formations of the earth's crust. They differ, indeed, . . . entirely from any formation which geologists have considered to be of deep-sea origin."[14]

Charles Schuchert, one of the most doctrinaire of evolutionists, admits about the same thing:

"Geologists have long sought on the continents for geologic sediments comparable to those now forming in the great abysses of the ocean, but to no avail. The German geologist [Johannes] Walther, who has carefully examined recent abyssal sediments, in his geologic studies has considered repeatedly whether any fossil rock possesses abyssal characteristics, and nowhere has he met with strata, either of Paleozoic or Mesozoic age, that by their structure and nature of deposition correspond to the present sediments of the oceans. Sir John Murray also failed to find oceanic rocks [among the fossiliferous beds]."[15]

The theory of the slow up-and-down movement of all the lands of the world, as taught a hundred years ago by Charles Lyell and still taught in all college textbooks by his followers, was invented to help explain away the striking, visible evidence which we find everywhere that the waters once "stood above the mountains." Ps. 104:6. This slow elevation and submergence of the lands has always been a very vital part of the theory of evolutionary geology, and is still carefully taught in all the common college textbooks dealing with the earth and its features.

But from the evidence given above, we see that the support for such a theory is either entirely nonexistent, or, if

[14] Archibald Geikie, "Textbook of Geology," 4th ed., p. 820. London: The Macmillan Company, 1903.
[15] Charles Schuchert, "Textbook of Geology," p. 481. New York: John Wiley & Sons, 1915.

not entirely lacking, it is so slight and trivial in amount as to be not worthy of the serious attention of truth-loving people.

If Lyell's scheme of geology is true, then the world has been populated by animals and plants for countless millions of years, and the theory of organic evolution in some form would be much more reasonable than any modified form of successive creations that could be devised. But if the Bible history of a universal flood is true, then this one world-cataclysm would explain all the major phenomena of geology, and the few minor puzzles which would then remain unsolved would not be greater than the puzzles which confront us in every single one of the other fields of knowledge, and which no reasonable person thinks of as serious obstacles to confidence in their general results.

V

It would not be in place for me to take up the different kinds of fossil animals in detail, and to show how the great majority of them, alike in all parts of the world, show clearly that they were overwhelmed and buried by some very abnormal condition of affairs. A few outstanding kinds, like the trilobites and the dinosaurs, are all gone, with no living representatives. Yet, though the great majority are similar to or even in thousands of cases *identical* with kinds which are alive today, the conditions under which we find them indicate that they came by their death and burial in some abnormal or unmodern manner.

Large reptile skeletons occur in Spitzbergen, where no reptiles could possibly live in modern times; elephant bones by the thousands, in northern Siberia and Alaska; brachiopod and mollusk shells usually occur with the valves applied and empty of sand or other sediments, showing that these shells must have been buried while they were full of animal substance; fishes with every fin and scale in position and in

such profuse numbers that they have even been assigned as the chief source of the petroleum deposits of the entire world.[16*] Anyone who can look all the evidence in the face and still say that uniformitarianism is a reasonable theory of geology, must possess a strong will thus to believe.

De la Beche, whom I have already quoted, has left us some very candid statements about the evidence from fossils in general:

> "When we attentively study the mode in which animal organic remains occur, we perceive that, though there are very considerable differences in the amount of their preservation, a very large proportion of them must have been entombed uninjured, and many alive, or if not alive, at least before decomposition ensued."[17]

This is the matured testimony of an experienced geologist, the first man to be appointed to have charge of the British Geological Survey; and it is a testimony about *all* the fossils, or about the fossils in general. Obviously, it fits into the flood theory, and it does *not* fit into Lyell's theory of uniformitarianism.

The La Brea pits on the west side of Los Angeles, California, have become famous all over the world. I have personally seen specimens from this deposit in most of the geological museums of England and Continental Europe, to say nothing of those of this country. I had the good fortune to be able to visit these pits while they were being excavated, and to go down into one of the pits which had been dug to a depth of about eighteen feet. The bottom and the walls were composed of a sticky tar which was so completely packed full of bones that it seemed impossible for the tar to contain any more.

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[16] See "Fishes the Source of Petroleum," by J. M. McFarlane. New York: The Macmillan Co., 1923.

* Some further details about various classes of fossils will be found in the present author's "Evolutionary Geology," pp. 227-257.

[17] H. T. de la Beche, "Researches in Theoretical Geology," p. 265. London: Charles Knight, 1834.

The locality is a depression forming a natural outlet for a large area to the east; and it is obvious that the floating carcasses of uncounted numbers of animals were piled up in this area, like a huge jam of logs, probably extending for furlongs or even for miles on all sides; but only those spots which became impregnated with oil from below were preserved, and the bones around outside the spots of oil rapidly decayed, though they have left much limy matter behind, as all the surrounding sands are still very calcareous.

The commonly received explanation of this remarkable deposit is that the pools of mineral oil were there, and the animals came along one after another and tumbled in, getting mired in the oil and becoming unable to extricate themselves. True, some modern animals have thus become trapped in the oil, their bones being thus preserved also. But the great majority of the animals did not perish in this way; for in that case why should the great majority of all the bones be broken, mashed, contorted, and all mixed up together? The chance trapping of the animals will never explain such a mass of broken and contorted bones as were found here.

These pits, few in number and of comparatively small extent, have furnished a total of two thousand saber-toothed tigers, three thousand giant wolves, with large numbers of imperial elephants, mastodons, lions, camels, huge megatheriums (ground sloths), horses, bison, and several kinds of large birds, besides uncounted tons of fragments so smashed and broken as to be almost or wholly beyond identification. It would be quite impossible to compute the incredible numbers of animals originally buried here. The majority of the kinds show that character of large size which is the usual thing in all antediluvian animals.

Nothing quite similar is known elsewhere, but recently several deposits of bones have been found in the sides of a large lignite mine in the Geisel valley, near the ancient city of Halle, Germany. The lignite here is worked as an open

mine, but the deposit is very deep, ranging from 150 to nearly 300 feet in depth. In the walls of the coal mine are the deposits of bones. I quote from a recent description:

"Bones of extinct animals, and other remains of ancient life, are not common in lignite mines elsewhere in the world, for the humic acids generated by the matted vegetation that formed the lignite slowly ate them away. But in the Geiseltal deposits, inflowing alkaline waters protected them from this action, while ever-renewed deposits of leaves and stems and detritus from above buried them beyond the reach of bacteria and the action of the weather. So it was at first with surprise and then with delight that scientists beheld the uncovering of great masses of buried bones, teeth, and horns of large animals. . . .

"Another unique feature is the presence of so many small and delicate things, that are totally lacking in almost all other fossil deposits: bats' bones, feathers, the remains of animals' last meals, even brains and nervous systems preserved by geologically miraculous accidents of natural chemistry. . . .

"The barest catalogue of the finds is impressive. Remains of some 7,000 vertebrate animals alone include 1,600 fish skeletons, 300 amphibians, 300 turtles, 250 frogs, 200 lizards, 100 snakes, 60 crocodiles, 100 tapirlike creatures called *Lophiodon,* 120 extinct horses representing four distinct species, 25 primitive pigs, 100 bats, 1,000 small mammals of various types."[18]

No comment of mine is needed to point out that here we have a clear case of a flood burial, the exceptional circumstances in this case having preserved many things which in other cases, which may have been similar to begin with, were soon obliterated by the usual agencies of disintegration and decay.

Many other deposits of bones in various parts of the world have been exploited for commercial purposes, either for making animal charcoal for use in the sugar factories of Marseille, as was the case with the Palermo breccias (Prestwich), or for use as fertilizer, as in the case of a deposit on the west side of the Red Sea, which a friend of mine saw

[18] *Science News Letter,* Oct. 3, 1936, pp. 218, 219.

when the ship on which he was coming from the Orient happened to call for a brief time.

VI

A very important fact about the ancient fossil world helps us to see how sharply and precisely it is separated from the present. For all the fossils, when looked at in a broad, general way, always supply us with specimens larger and much more thrifty looking than their modern representatives. This is as true of the plants as of the animals.

We might begin with the invertebrates of the Cambrian and Ordovician beds; we might consider the giant ferns of the Carboniferous, the monstrous amphibians and reptiles of the Permian and the Cretaceous; or we might speak of the elephants, rhinos, and hippos of the Pleistocene, with scores and hundreds of other examples. The modern kinds are smaller or less thrifty looking, and in some cases they are little better than degenerate dwarfs. I have devoted a chapter to the subject in my "Evolutionary Geology," and need not repeat the details here.

But the main point in this connection is that this remarkable characteristic of large size and superior vigor of appearance is true of *all* the fossils, and when we pass over to the modern era, the change is sudden, abrupt, with no transition forms at all. Of course, the fossil world had a most wonderful climate; and this astonishing climate of springlike mildness, even into the Arctic regions, was probably chiefly responsible for the size and vigor of the animals and plants of the ancient world. Plants and animals always thrive best under the optimum conditions of climate and the other forms of environment, such as food and freedom from parasitic and other diseases. In the ancient world all these seem to have been at a maximum, and *always and continually at a maximum;* while when we cross over to our modern world

(dismissing for the moment the alleged "glacial age," which can be otherwise explained), the change of size and vigor among the plants and animals coincides exactly with the abrupt change in world climate. Taken together they serve to emphasize the fact of a sudden, world-wide catastrophe, corresponding to and coinciding with the burial of the fossils in the rocks, which we say was due to the flood of the Bible. The evidence is clear and very convincing, if looked at without evolutionary bias and false "facts" which have so long been broadcast for propaganda purposes.

VII

Apart from the records of plant and animal life, there are two large sets of physical and chemical phenomena which ought to show us clear records of the world catastrophe of the deluge, if such an event really took place. These two classes of phenomena are *mountain making* and *igneous action,* or the action and effects of heat on the rocks of the earth. For if we assign the burial of the fossils to the universal flood, then the mountain making of the world must have been a comparatively quick work at the close of the flood; because all the major mountain ranges of the entire globe are largely composed of water-formed beds containing fossils. But to do all this in so comparatively short a time would imply much violence to the rocks which could not fail to develop an amount and a degree of heat which must register itself in metamorphic changes in the rocks themselves.

Thus we need to consider briefly the subjects of mountain making and the metamorphism of the rocks by heat, to see how these phenomena relate themselves to the flood interpretation.

I am not here concerned with volcanoes and volcanic action. For volcanoes are "modern" affairs; that is, there are no typical volcanoes which can be proved to antedate the

flood. They all rest upon or arise out of sedimentary rocks, and they are now well understood to be only comparatively shallow in their origin, Major C. E. Dutton testifying that many have their origin less than one mile deep, and very few are more than two and one-half miles deep: "The indications are that most of the volcanic eruptions originate at depths between one mile and two and one-half miles."[19] This is not *deep,* as compared with the size of the earth. All this fits well into the picture of flood geology, as does also the fact that there are only about 485 active or modern volcanoes, with three or four times as many extinct ones, thus showing that volcanic action was much more universal during or soon after the flood than at present.

VIII

Everyone acquainted with the mountains has seen many examples of stratified beds, which must originally have been spread out horizontally by water, but which are now tilted into all sorts of positions, and have been twisted or contorted in a great variety of curious and wonderful ways. Right on the face of things they *look* as if all these disturbances or changes of form and position must have taken place while the beds themselves were soft and unconsolidated. All this would not be at all strange on the basis of the flood theory. But to the believers in "ages," with some of these beds laid down many millions of years *before* others, yet all twisted together by the same disturbing cause, much as one might twist or bend different-colored layers of putty, all this is a very great puzzle indeed. For they argue that the earliest beds must have become hard before the others were deposited upon them; for according to the theory the lower beds were formed many millions of years before the others. But how,

[19] *Journal of Geology,* May-June, 1906, p. 261.

then, could even the first be bent and contorted like soft wax or putty?

And so for two or three generations we have been taught that any rocks whatever, even the most crystalline and the most siliceous, will become plastic and will bend without breaking, if the pressure above them is sufficient to hold down the upper layers. All this has been accepted without any adequate experiments to confirm it, and has been taught by all geological textbooks, because it seemed necessary if the theory of great differences in age of the various beds were to be sustained. The most fundamental idea of evolution, the background for the entire idea, rests upon the enormous *differences in age* of the various stratified rocks; hence as this idea *required* that all rocks will flow like putty when subjected to sufficient pressure, this must be a fact.

But recently some men of the Geological Society of America thought it worth while to test this matter; so they arranged to have the use of P. W. Bridgman's wonderful pressure apparatus at Harvard, the strongest high-pressure apparatus in the world. In this way they could duplicate the pressures prevailing in the earth down to even thirty or fifty miles. The results are well stated in the following:

"Contrary to past geologic beliefs, it was found that, under high pressure, rocks will not flow indefinitely, but will break if deformation is carried far enough; and it was found that sudden differential stress is not required to produce fracture under high confining pressure, but that a strong, steady differential pressure will cause fracture if applied long enough."[20]

In view of the fact that quartz (silica) is the most common of minerals and that it is the most common constituent of rocks, almost all rocks except the limestones being more or less siliceous, it is interesting to note the way in which quartz acted under these enormous pressures:

[20] *Science News Letter*, Dec. 17, 1938, p. 388.

"Quartz, which is geologically important as one of the commonest minerals, remained brittle under the very highest pressures. The only change in quartz, aside from fracture, was an alteration of optical quality known as 'undulatory extinction.' Prior to these tests it was thought that quartz might become plastic under the high pressures."[21]

We may regard it as now conclusively settled that the bending and twisting which are seen in almost any mountain region must have taken place very soon after the beds themselves were laid down by the water. And we know that, while beds of sand may not harden up so quickly, it would be only a matter of weeks or perhaps even of days for almost any form of limestone to become indurated or hardened; for natural calcareous deposits seem to "set" almost like our modern concrete.

Perhaps the reader can now understand one of the problems about disturbed or contorted strata which used to present itself to the evolutionary geologists. For as they believed in immense differences in the relative ages of the strata, they could not understand why one set of beds (for example), which they said was many millions of years older than another set, had not been completely consolidated long before the younger one above it was deposited. Yet they are all, old and young together, twisted and bent into every imaginable shape, like layers of different-colored candy, indicating that they were *all soft together*. This was the reason for the long-held theory that all rocks can be bent and twisted if only sufficient pressure is applied. This is now proved to be untrue. The evidence therefore is now very strong that all these stratified rocks were still soft and unconsolidated when the disturbances took place. Of course, igneous or fire-formed rocks were in a molten or semimolten state when they were subject to the twisting and contortion which their present state shows.

[21] Ibid.

IX

But what was the cause of the movements which produced these disturbances of the rocks? They were undoubtedly connected with the elevation of the mountains, though they were far more universal over the globe than this might seem to imply; for hundreds of miles away from any mountains, in what is now flat level country like Kansas or Oklahoma, the beds down deep underneath are also found to be often contorted and bent just as they are in the mountain regions. In the prairie country we do not find these disturbances of the rocks except by boring deep wells or by mining, while in the mountains these conditions stare us in the face on almost every side.

The subject of mountain making is a large one, and need not be entered upon here. Those interested should consult some good textbook on geology. Here it must suffice to state the amazement which evolutionary geologists manifest at the well-established fact that all the great mountain ranges of the world were elevated only *after* essentially *all* the stratified beds were laid down. The mountain making seems to have been practically *one event,* and all the mountains seem to date from about the same time, at about the close of the other geological events. I am now talking in terms of the "ages" of evolutionary geology. For us it means that the mountains were all made at essentially one period, during or immediately after the flood.

The reason why geologists have to take this position is that all the great mountain chains—Alps, Rockies, Andes, and Himalayas—contain very "young" fossils, or fossils which belong only in the latest formations; and of course the mountains could not have been elevated until after these "late" fossils had been deposited by ocean water in the beds where we find them. Obviously the mountains could not be elevated until after the marine beds were laid down which,

now as hard rocks, go to make up the mountains. And all the mountains of the globe (except the scattered volcanic peaks) are composed in large measure of sedimentary beds which must have been originally made by flowing water, usually ocean water.

Bailey Willis, in his monograph, "Research in China," says of the mountain ranges of much of Asia, including the Himalayas and the other ranges of that region, that they "challenge credulity by the evidence of their extreme youth."[22]

And James D. Dana declares:

> "It has been thought incredible that the orographic climax [of mountain making] should have come so near the end of geological time, instead of in an early age, when the crust had a plastic layer beneath, and was free to move; yet the fact is beyond question."[23]

And he adds that this very late period for the making of the mountains, "is one of the most marvelous in geological history."[24]

All the modern textbooks which I have consulted seem to avoid this subject. It is an awkward one for them; for they don't know how to explain it in terms of their theories. But this subject that is very embarrassing for them becomes a fine one for us, to help prove the truth of the flood interpretation.

But how were the mountains made? Chiefly by elevation and subsequent erosion. An old geological fable taught that the mountain ranges are simply the wrinkles on the surface of a cooling and contracting globe, the wrinkles having been puckered up by the shrinking due to the contraction. According to this the mountains would have to be largely pushed up by lateral pressure. And this served to help out the other

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[22] Bailey Willis. "Research in China." Vol. II, p. 24. Washington: Carnegie Institution. 1903-04.
[23] James D. Dana. "Manual of Geology." 4th ed., p. 1020. New York: American Book Company. 1895.
[24] Id., p. 392.

theory of great overthrusts, where great areas of hundreds of square miles are now found in the "wrong" order relative to the alleged "age" of the rocks underneath, allegedly "older" rocks being now on top of much "younger" beds. The two sets of beds happen to be parallel to one another for immense distances, and even in a now horizontal position, all just as if they had actually been all *deposited exactly where we find them.* But the *relative order* of the rocks is wrong, or the evolution theory is wrong; and so we are asked to deny all the evidences of their present position and condition, and to say that these mountain masses were pushed over where we find them, although the line of contact between them shows absolutely no signs of slippage.

This topic will be referred to in the next chapter. Here I wish simply to introduce testimony from Dr. William Bowie, formerly head of the U. S. Coast and Geodetic Survey, who has long been known to refuse to believe in these alleged horizontal overthrusts. Bowie himself has written on the subject; but I shall merely quote from a summary of his conclusions as given in a review of one of his reports:

"Mountains have been produced almost wholly by vertical uplift, and not by horizontal thrusts. The latter are said by Bowie to be inconceivable from an engineering point of view."[25]

Flood geologists can endorse every word of this; only they might think that "inconceivable" is too polite a term. At any rate, it is wholly due to a determination to save the evolutionary theory of the fossils that any such "horizontal thrusts" were invented in the first place.

Most people are familiar with the fact that earthquakes do their worst damage on soft ground. This is always the case. The reason is that earthquakes tend to throw soft ground into undulations like the waves of the sea; and this

[25] *Nature,* Nov. 15, 1924.

plays havoc with any buildings resting upon this soft foundation. That there were extremely violent movements of the earth at some time in the long ago (flood geologists would say at the time of the flood and immediately thereafter), is admitted by every geologist. The evidence for this is the fact that there are many faults or slips in the rocks of half a mile or even more of "throw" or vertical displacement, a piece of evidence which can be seen and measured. Some earthquakes in modern times have left displacements of ten feet or so; what sort of earthquake would it be that would throw one side of a fault two thousand feet higher than the other side? Even if it were not all done at one fling, it would be bad enough if it were done in a series of such convulsions.

The following from Suess compares the modern with the past in this respect:

"The earthquakes of the present day are certainly but faint reminiscences of those telluric movements to which the structure of almost every mountain range bears witness. . . . Such catastrophes have not occurred since the existence of man, at least not since the time of written records."[26]

With many displacements of one thousand or two thousand feet taking place in various parts of the world as the mountain ranges were rising at the close of the flood, the earthquakes thus generated could not fail to throw the soft, unconsolidated strata into great disturbances, the results of which are well set forth in the following from a paper by E. H. L. Schwartz read before the British Association for the Advancement of Science at Victoria Falls, in 1905:

"The author objects to the usual explanation of rock folding as produced by a direct tangential thrust against an obstacle, caused by shrinkage of the earth's crust, and suggests that it may, in fact, be gradually produced by earthquake waves traveling through one

[26] Eduard Suess. "The Face of the Earth," Vol. I, pp. 17, 18. Oxford University Press, 1904-09.

kind of rock (say sedimentary beds resting on granite) and encountering a mass of rock having a different modulus of elasticity (as, for example, a boss of the underlying granite). The effect of this would be to heap up the strata in folds against the obstacle, somewhat as when waves break on the shore."[27]

A closely related set of phenomena take place when deeply piled-up sediments accumulate over an ancient irregular surface, such as a number of primitive or antediluvian hills. Deposition might easily accumulate almost as much depth of sediments above the tops of the hills as in the valleys, somewhat as a heavy fall of snow may accumulate over the tops of small buildings as well as on the surrounding land surfaces. When these deeply accumulated beds, perhaps a mile or more in thickness, are shaken by an earthquake, the beds on the higher parts would necessarily tend to slide down on both sides, resulting in gigantic folds and contortions of the stratification, such as we often find near the base of the mountains. Not only so, but all sedimentary beds tend to shrink considerably under long pressure, owing to the squeezing out of some of the water: and this shrinkage would also result in disturbances around the base of any underlying irregularities or elevations, for the strata at these bases would be thicker and hence would shrink more than would the beds over the tops of these elevations.

Thus in many ways we can easily account for all the observed irregularities in the strata which have been actually observed, without having to invoke any such absurdities as are involved in the shrinking-of-the-earth theory. Flood geology will readily solve these puzzles, many of which cannot rationally be solved in any other way.

There remain the related phenomena of the ancient lava outflows, which cover immense areas in the northwest part of the United States, in central India, in the Lake Superior

[27] *Nature*, Nov. 23, 1905, p. 91.

region, and in many other parts of the world. In these regions as elsewhere there may be some important volcanoes, and these may have produced large outpourings of rock; but I am referring to the more ancient lavas, which were not produced by any vents which can be discovered, but were probably vomited from flat vents or fissures which are now covered up.

But a very interesting point about many of these lava flows is that in most of the original reports about them they are described as having been poured out *under water.* In such cases the upper surface of the lava may form the irregular "pillow structure," as it is termed, owing to the rapid cooling of the lava. And I am convinced that many of the instances called "intrusives" in the textbooks, which are supposed to have flowed sidewise in between horizontal strata, are really cases of lava poured out at the bottom of the water, but *rapidly covered by a new deposit* of sedimentary materials. In such a case both the underlying and the overlying beds have been baked by the heat of the lava, the extent of the baking being determined partly by the thickness of the lava bed. Such "intrusives" used to be called "sills," a name which is much better; for it does not carry a very doubtful theory in the name itself. The Palisades on the west of the Hudson River and the great Whin Sill in the north of England are examples. But there have been thousands of such subaqueous lava flows in all parts of the world which were rapidly covered by beds of sedimentary materials, the latter to be in turn again covered by more lava, and again covered by sediments.

The convulsions through which the earth was passing must have generated an immense amount of heat within the rocks of the crust; for the rock friction thus generated would be immense, and almost the entire mechanical work of the movements involved is transformed into heat, and this heat is conserved within the rocks and tends to melt them. All

this was doubtless the method by which such large areas of molten rock were produced, the true volcanoes being of another though sometimes a related phenomenon.

It would be inevitable that the stresses and strains to which the crust of the earth was being subjected would produce fractures and dislocations in those rocks which were already indurated. And it is a fact that almost every part of the earth gives evidence of the rocks' having gone through just such experiences at some time in the long ago.

Probably no area on the face of the earth ten miles square could be found which would not show evidences of faults or fissures or dislocations if sufficiently examined.

And these conditions, like the many others which have been spoken of in the preceding pages of this chapter, are mute evidence of that time when the convulsion-racked earth, "being overflowed with water," was wiped clean of its plants and animals and surface features by the flood, and only renewed again by a real miracle of God's grace, and prepared for the races now inhabiting it. This postdiluvian world is not so pleasant in its climate or in its bountiful supply of food for man and beast; but it is more suited to man in his sinful condition. For that primal world was far too good for fallen man; the present is what is best for him. But in the near future, thank God, all things will be renewed and restored to their original perfect state.

CHAPTER EIGHT

The Case Against the Evolutionary Ages

I

IT is exceedingly important for the reader to understand the relation of the *time* element to the other parts of that complex which we call the evolution doctrine. For the relation of the time element to the rest of the theory is almost universally misunderstood. But after long study of the entire problem, I have concluded that the time element is in many respects the most important of all.

Its importance is illustrated by the fact that the first phase of the evolution theory to become popular was the idea that the earth has existed and has been peopled with animals and plants for immense periods of time. And today, after a man becomes convinced that Darwinism is a mistake, and that the fossils have been shamefully manipulated and fraudulently used to prove the successive types of life, he will still generally stick to the idea that the world is many millions of years old, and that the first chapter of Genesis is only a beautiful allegory or myth.

All of which adds up to the conclusion that the evolution theory is vastly more than the origin of species. For anything that destroys faith in Genesis in the matter of time, will effectually destroy any genuine faith in its being a revelation from God.

I readily admit that genuine faith in Genesis can exist without the acceptance of Ussher's system of chronology. A dependence upon the Septuagint will permit of a thousand years more. But no chronological system that I have ever seen (and I think I have known of nearly a dozen) can possibly stretch out the Bible figures to ten thousand years; while any scheme of organic evolution wants at least a million times this much.

For three or four generations the world has been bombarded with the millions-of-years idea, and it has proved one of the most effective deceptions in the entire kit of evolutionary propaganda. Instinctively the advocates of the theory know that to make their view plausible they *must have time,* and *plenty of it.* They know that spontaneous generation, or life from the not living, has been completely discredited by scientific discovery; so their theory makes a very poor start. It has also been proved that no single instance is known of one kind of life's having been transformed over into a distinctly different kind of life within modern times; and thus another important link in their chain of evidence is missing. But they work on the principle that, if all these problems can be pushed back into the dim shadow of a thousand million years ago, then almost anything may be supposed to have happened, and biological and geological fiction can be made plausible for the fooling of children and credulous adults.

The explanation of the striking success of this millions-of-years propaganda is that it is not a logical, but a psychological, concept. And man is not a logical, but a psychological, animal. Even his ideas about the early days of the world are based more on "instinct" than on enlightened reason or hard, cold facts. And by "instinct" I mean in this instance a body of ideas (usually anti-Biblical) which have become so deeply embedded in the racial consciousness that they seem "natural," and it takes a violent force of the mind to dream of any-

thing else. And this propaganda for vast millions of years as the measure of the world's career has now become so deeply ingrained in all the literature of the day and in the racial thinking, that anything to the contrary seems unreasonable and palpably untrue. The burden of proof, and it is a terrible handicap, rests upon those who would advocate any short chronology for the history of the world.

What I am after here and now is to help the reader to see how this overwhelming world conviction has come about. For this state of affairs must have a history, and its history will furnish us with the method of understanding it, perhaps also with a method of meeting it. For errors, like apples, have a fashion of ripening with the passage of time; and the Manager of the universe usually has a way of planning to take care of the crop when it matures. And there are plenty of facts now available to prove that these many millions of years are only the product of blunders and a strong will to disbelieve the revelation which God has so mercifully given the race.

The first apparently scientific contribution to this theory of a great age for the earth was made by A. G. Werner's "onion-coat" hypothesis of the origin of the various minerals composing the crust of the earth. Werner, who was a teacher of mineralogy in northern Germany, may be regarded as living contemporaneously with the early days of the American Republic. But he taught as an actual fact of proved science that all the various classes of minerals had been precipitated one after another from the same primitive ocean which had contained all these minerals in solution. Hence the lower ones must obviously be the oldest, and by estimating the rate of precipitation (which could not have been rapid), one could arrive at a rough calculation of the age of the earth. In any case, he said, it must have taken a great many millions of years for it all to take place. Werner was not interested in the history of the plants and animals, which were not much

involved in his scheme of the earth, but were still supposed to have existed on the earth for long periods of time.

Partly contemporary with Werner, but extending nearly a score of years later, was the remarkable career of Baron Cuvier (1769-1832), the founder of the science of vertebrate paleontology, or the study of fossil vertebrate animals. He believed that there have been a great many successive creations and catastrophes, the last great cataclysm corresponding to the flood of Noah. Though a religious man and a Protestant, he repudiated the Biblical chronology, though his total for the life of the animals on earth was only fifty or sixty thousand years, and he felt able to compress man's career into the few thousands of the Bible chronology.

Meantime all the sciences were making tremendous strides, and the new system of arranging the fossils in an alleged chronological sequence gradually displaced the mineral chronology of Werner, though the two systems lived side by side and were both employed for several decades. But with Charles Lyell (1797-1875) a theory of "naturalism" or uniformity displaced the successive catastrophes of Baron Cuvier, Lyell's theory tacitly or explicitly denying that any such event as Noah's flood ever took place. Under Lyell and his followers the chronology of the earth's history became enormously stretched out; for it would be highly unreasonable to explain all the past geological changes as due to slow, gradual changes like those (allegedly) going on today, without asking for long periods of time. Indeed, it was the boast of Lyell and his followers that it was more reasonable to ask for *time* to explain these changes recorded in the rocks, than to invoke a greater display of *energy,* as the catastrophists had done. They said it was a case of energy versus time; and with them time was asserted to be more reasonable than energy, to explain the past of the earth's history.

True, Lyell's predecessors, James Hutton and John Playfair, after whom he patterned his theory of geology, had

unblushingly taught the past eternity of the earth; they saw no vestige of a beginning, and no sign of an end to the career of the earth. But Lyell himself was extremely cautious in openly running contrary to the then-accepted views of his religious contemporaries. I quote some remarks about Lyell as delivered by Professor William H. Hobbs, of the University of Michigan, a few years ago:

"By a forceful and lucid literary expression and a diplomacy and tactfulness in dealing with those questions which were in conflict with church dogma, he [Lyell] succeeded completely where Hutton had utterly failed."[1]

This means that Lyell succeeded in getting the world and the church to accept his thoroughly anti-Biblical system of geology which denied the flood and taught long ages for the past of the earth's history. Professor Hobbs goes on to show Lyell's methods in dealing with the points where his system was contrary to the plain teachings of the Bible:

"Lyell himself was most careful to avoid a frontal attack upon the citadel of the church. He preferred unobtrusively to sap and mine, and he did this with a success of which geologists are now well aware, and by so doing he reaped rewards which might have come to the pioneer, [James] Hutton."[2]

Lyell's system of anti-Biblical geology became wonderfully popular, his books went through edition after edition, and he became one of the most famous scientists of the world. And it was Lyell's geology which laid the foundation for Darwin's *coup de grace* against the Christian system. For a hundred years the leaders in the Protestant and the Roman churches had accepted without any qualms that there had been a long series of successive creations and destructions of plants and animals; that suffering and death have prevailed among the animals for uncounted millions of years; and now when Lyell scoffed at the idea of the flood of Noah, and taught that

[1] *Science*, Sept. 17, 1926, p. 265.
[2] Ibid.

the present order has always prevailed backward into the long-drawn-out past, they accepted that, too. "All things continue as they were from the beginning of the creation."

But they balked at the petty, insignificant point of the origin of species. They all took an uncompromising stand on the *fixity* of species: the thistle and the cactus had always had thorns; the tiger was created expressly to kill and devour smaller animals. They had no quarrel with Lyell that man had appeared mysteriously at the close of the "glacial epoch;" but they concentrated the vials of their wrath on the man, Charles Darwin, who had sought to show that naturalism and uniformity in nature might also be extended to explain the way one kind of life had changed or grown into another.

Lyell lived to see the triumph of Darwinism. He was personally acquainted and on terms of intimate friendship with Darwin and all his champions, Huxley, Wallace, Hooker, and Spencer. But he "was careful to refrain from any public expression likely to bring himself into conflict with the church."[3] And so the leaders of the church outdid one another in their honors to Lyell; and when he died, they buried him in Westminster Abbey. And his system of evolutionary geology has now for many years been firmly established in all the universities of the civilized world, and appointees trained under his system are in charge of all the government geological surveys, and are the scientific heads of all the big commercial oil companies and the mining concerns of the world.

II

It will now be in order to consider briefly how the long-drawn-out chronology of so many millions of years has been built up.

It came about partly by Lyell's system of uniformity, of

[3] Ibid.

making the present always the measure of the past in the matter of explaining all the geological changes. For if the coasts of all the continents are on the seesaw up and down, they must be moving very slowly; and it would need immense ages to account for the way in which the alternations in the coal measures, for instance, were formed on this basis. First a peat bog lasted for a long time, to produce enough carbonaceous matter to make a coal seam twenty or forty feet thick; then it had to be lowered slowly into the ocean, to receive a load of deep-sea crinoids and other materials; and then again it had to be lifted above the waters, to grow a new set of peat. And this sort of up-and-down operation would have to be repeated over and over again in the same locality; for there are frequently seventy-five or one hundred successive seams of coal one above another. And all this would require immense ages for its accomplishment.

But there is still another way in which this idea of long ages had been built up. It had come in long before Lyell, who only took over what was already well accepted, though he and his followers amplified and extended the idea and the method.

In every part of the world geologists found the different kinds of life alternating with one another, though often only one or two kinds would be found in a vertical position in any specific locality. Some trilobites might be found in many successive beds for a great thickness; and then a set of brachiopods, the two kinds perhaps occupying several thousand feet of sediments. To one side, perhaps, but overlapping the others, might be a set of beds containing chalk, or perhaps bones of the large reptiles, or possibly some bones of mammals.

Now it was assumed that obviously these distinctly different kinds of life must have lived in different ages of the earth's history. This idea, as I have said, was considerably older than Lyell; but he and his devoted followers took it over and greatly amplified it. And, presently, one hardly knows

by what mental legerdemain, we find it a universal practice among geologists to name all the fossiliferous deposits of the globe according to the kinds of fossils found in them, and to arrange the whole in a colossal ascending scale from the simple to the complex, so as to make a succession of life for the world as a whole. Under this system, whenever an exploring geologist went into a new region, and found some fossils like those already reported from England or the Eastern States, this new deposit could be ticketed and placed in its proper pigeonhole in the great ladder of life. By now most of the deposits of the world have thus been named and ticketed from the kinds of fossils found in them or found related to them above or below; and this scheme of successive types of life has superseded and now controls every other method of classifying the rocks.

Presently we shall need to analyze this idea of the successive types of life, to see if there are any lurking fallacies in the method. But just here I want the reader to see how this method of picking out certain types of life from here and there and arranging them in a succession for the world as a whole, helped to add enormously to the length of time required for the total of what is usually called "geological time."

In any specific locality the total thickness of the beds is not usually more than a few hundred or at the most a few thousand feet. I mean, that in any locality one cannot go down more than a comparatively short distance before coming to the granite or other nonfossiliferous rock, below which one will never find any more fossils. In a few localities this total thickness of the fossil-bearing strata is five or six thousand feet, as at the Grand Canyon, or even ten thousand feet, as at Banff, Alberta.

But the geologists will tell us that the total of the "geological column," or the total thickness of all the fossiliferous deposits of the globe, is *about seventy-five or one*

hundred miles. This huge total is of course only an artificial aggregate, made by adding the total in one representative locality to the totals from other representative places around over the world. But it is always treated as a genuine reality, and is made the measure for the total period during which life has been in existence and during which slow geological processes have been going on all over the earth.

Thus we have the various types of life, trilobites, brachiopods, dinosaurs, mammals, etc., arranged into different successive ages, thus making *differential ages* for the different deposits. And the total of geological time is made by adding up all these different ages into one grand sum, and making the amount of time represented in any one locality only a mere fraction of the total length of time during which these geological changes have been going on.

Accordingly, if on Lyell's principle of slow, gradual change, a very great length of time would naturally be required to make the total thickness in any specific locality, what an enormous amount of time would be required to make the grand total of 100 miles of deposits from all over the globe.

It is thus that the great length of geological time has been made up. It is not a fixed period, but is variously estimated at from a thousand million years upward. Nobody can possibly comprehend what a thousand million years means; so that when events like the origin of life from the not living, or the transformation of one kind of life into another, are assumed to have taken place in the long ago, the psychological effect is that almost anything may be assumed to have happened back there, even though it is unscientific to assume that it can take place today in our modern world. The result is that when a man once gets this idea of the geological "ages" into his soul, it becomes quite impossible to refute his theories by any such troublesome facts as may be found turning up here and there in our present workaday world. He is

usually quite immune to such argument. If you believe that life has gone through the vicissitudes of a thousand or ten thousand million years, almost anything becomes possible, and organic evolution is much more reasonable than would be a long succession of separate creations, which it is always assumed is the only possible alternative.

But how is the believer in the Bible to meet a situation like this? On his own part he may have such sublime faith in the Bible that the arguments of the evolutionary geologists have no effect upon his intellectual bulwarks; or he may be able to answer these arguments with what he thinks are better facts and arguments. But it is safe to say that there do not seem to be any very promising indications of an abandonment of the evolutionary scheme on the part of the world as a whole.

Consider the situation. Essentially every scholarly book in every language, including Japanese, Chinese, and Turkish, not to mention German, French, and English, either assumes these vast geological ages, or teaches them openly as the foundation of all other thinking. Every university in every land teaches them. They are blared over the radio in every civilized language, and are drilled into the minds of all who can read the daily papers, by means of the tireless propaganda that such and such a fossil has just been found which is fifty million years old, or one hundred million years old, as the case may be, attested to by the great Professor So-and-So from such a university. In any big city, like New York, the children are taken in class formation by their teachers every so often to the museum, where they see before them the skeletons and other remains of prehistoric animals arranged in what is said to be true chronological order, and moreover the weird effigies of fossil man, also arranged in an evolutionary series, all of which are carefully explained by their teachers.

All this has been going on now for two generations. And

if there are still any intelligent young people of high-school or college age who have not been browbeaten by this perpetual propaganda, one must assume something almost like a miracle. Which adds up to the conclusion that the intellectual thinking of the entire world has by this time been made over into an evolutionary way of looking at every subject and every problem of life. As for the outlook for the future, one can look forward only to more of the same thing —time without end—unless the good Lord comes and puts a stop to it.

I am not now concerned with pointing out how the prophecies of the Bible, notably such prophecies as 2 Peter 3:3-7, have foretold just such a state of things. What is now in order is a study in the scientific facts which are dead against these evolutionary ages, showing that the fossil record has been misunderstood, and that in reality all the fossils could have lived contemporaneously in the same world, and been overwhelmed and buried by the waters of the flood. For if the fossil record has been misunderstood and misrepresented, we ought to be able to point out the errors, if we have a reasonably complete knowledge of the fossil world, as seems to be the case.

III

Let us now consider the problem of the ordinary superposition of one set of beds above another, or what is termed the facts regarding *time* which may be read from any ordinary case of superposition. This has always been considered a very simple phenomenon with regard to time. On the contrary, it proves to be somewhat complex, and may be in need of very careful examination.

We may distinguish three aspects in the time element in every case of superposition: (1) The time factor shown by the mere *sequence* in which the beds were deposited. (2) The time factor attaching to the *materials* composing the suc-

cessive beds. (3) The time factor attaching to the *fossils* contained in the beds.

1. It is evident that a genuine time element is shown by the sequence of the beds; for the lower of any pair of beds must have been laid down before the upper. The lower is obviously the older of the two. Whether the interval between them was long or short is not so self-evident. There must have been an interval of some sort, else there would have been one continuous bed, not two. Some clue with respect to the length of the interval may be surmised from a study of the physical aspect of the two beds, their differences in composition, and their contact surfaces at the plane of separation; but any estimate of the time interval must be very much a guess or a matter of personal opinion. Of course, if we detect any erosion of the surface of the lower bed, or if we notice any tilting of the lower bed so as to make the upper bed not exactly parallel to it, we would have a right to speak of an unknown additional time interval.

On the other hand, where there is a genuine *conformity* between the two beds throughout a considerable area, the physical evidence alone would clearly imply that the time interval was not very long. True conformity means almost a continuity of deposition. Only by importing other ideas, such as an assumed disparity in the age of the beds based on their greatly differing fossils, can any great lapse of time be read between the depositions of two conformable beds.

2. The time elements to be read from the *materials* composing two or more successive beds are not so self-evident. Let us suppose that we have three beds, limestone, sandstone, and conglomerate, in ascending order. Can we affirm with any certainty that these three kinds of materials represent genuine time values? That is, how can we know that the sand in the second bed was not already in existence somewhere when the limestone was being deposited, or that the gravel in the third bed could not have been in existence when

the underlying sand was being laid down? Obviously all three classes of materials *might very probably have been already in existence contemporaneously* in separated localities, the shifting currents having merely brought here into a vertical relationship these diverse materials which had previously existed in separated geographical relationships. To deny the probable contemporaneity of the materials composing these beds would seem to require a hardy dogmatism which is wholly foreign to the spirit of natural science.

We thus reach a very important conclusion, that *no real time values can be read legitimately from the materials composing any set of superposed strata.*

3. Thus far, I think, all students of geology must be in agreement. It is the problems raised by the *fossils* contained in the beds which may give rise to debate. Yet how are the fossils which may be found in these beds one whit different from the lime silt, and sand, or the gravel of which these beds are composed? Unless we already know from some outside sources of information that the different fossils found in the beds are of very different ages, it is logically clear that we are not at liberty to assign these fossils to three distinct ages, on the mere fact that they happen to occur here in three successive strata.

I do not see how this conclusion is to be avoided. And yet it really means that if the first beds contain trilobites and graptolites, if the second bed contains some dinosaur bones, and if the conglomerate contains some elephant remains, we ought to be clear enough in our thinking and honest enough with ourselves to own that, so far as their occurrence in such a succession of beds is concerned, we do *not* have the slightest grounds for assigning these three types of fossils to three very different ages in the earth's history. Those who keep on affirming distinct time values for these representative fossils ought to admit that they must have received this idea of their relative time values from some other source quite outside

their mere occurrence in a vertical sequence in the strata. Clearly it is unfair to assign time values to these fossils which we dare not assign to the silt, sand, and gravel composing the beds. Evolutionists, of course, feel confident that they have outside information that the trilobites, the dinosaurs, and the elephants lived in distinct ages; but one wonders *where they actually got this outside information.* They certainly did not get it by any logical or scientific reading of the rocks.

Now the history of the biological sciences shows that Agassiz and others, but Agassiz in particular, did claim that taxonomy and embryology should be used to supplement, or even to determine, the succession of the fossils. We have had occasion in some of the preceding pages to dwell upon this phase of the history. And Agassiz, for one, tried to bemuse himself with the idea that he was not constructing a scheme of organic evolution. He and his contemporaries thought that they were dealing with objective facts in a strictly objective or scientific way. But whenever we examine any of these basic ideas in embryology, or here in stratigraphic geology, we are almost driven to the conclusion that some evil spirit must have been hypnotizing these pioneer scientists, and leading them to read into the facts before them ideas and theories which were a perversion of the truth.

That part of the subject need not detain us here. Our only job now is to sum up what we have just learned from this study of stratigraphy, which is that the mere occurrence of distinctly different fossils in a vertical series of successive beds does not in itself furnish us with the slightest proof that these fossils belonged to distinct ages. Such occurrence of distinctly different fossils is just as compatible with the flood theory of the contemporaneity of all the animals and plants, as it is with the evolutionary succession in time. In fact, the latter idea has to be *read into* the record; it is not possible to extract this idea from the rocks without employing highly unscientific methods of reasoning.

IV

I distinctly remember that forty years ago, when I was feeling my way among the intricacies of this subject, with no pioneer to guide me, humanly speaking, the first important fact which I ran across contradicting this idea of the intrinsic time values of the fossils, was a case of Cretaceous lying in apparent conformity upon Carboniferous, all the intervening "ages" being absent. And yet from the objective evidence the two must have followed one another in comparatively quick succession. Examples have now been found in such numbers in all parts of the world that they have received the name of "deceptive conformities;" but at the time I mention, the field men dwelt upon their strange appearance as something almost supernatural.

This case that I thus first discovered is described by a well-qualified government official from the region of the Rockies just east of Banff, Alberta, as follows:

"Here again, although the two formations differ so widely in respect to age, one overlies the other without any perceptible break, and the separation of one from the other is rendered more difficult by the fact that the upper beds of the Carboniferous are lithologically almost precisely like those of the Cretaceous [above them]. Were it not for fossil evidence, one would naturally suppose that a single formation was being dealt with."[4]

In other words, these two successive formations seem to grade into one another, with transition beds which can be separated only by their contained fossils.

Here is another example which I ran across at about the same time:

"The Devonian limestone is apparently succeeded conformably by the Cretaceous, and with the possible exception of a thin bed of conglomerate of limited extent, which occurs below Crooked Rapid on the Athabasca, the age of which is doubtful, the vast interval of

[4] Geological and Natural History Survey of Canada, Annual Report, New Series, 1886, Vol. II, Part A, p. 8.

time which separated the two formations is, so far as observed, unrepresented either by deposition or erosion."[5]

Numbers of other examples will be found in the author's "Evolutionary Geology," Chapter IV. Similar examples are now known to occur in all parts of the world. Dr. E. O. Ulrich, who made a special study of such instances, and whom I met several times in Washington, D. C., and afterward at a Geological Congress in Madrid, Spain, once told me that he himself had probably seen and examined a thousand such cases. He seemed to think that their very numbers ought to show that they are of no significance, so far as helping to refute the evolutionary succession of life is concerned. I have frequently found evolutionists reasoning in this curious fashion.

Another interesting fact in this connection is that these conformable conditions of age-separated strata are often *repeated over and over again* in the same vertical section, the same kind of fossils reappearing alternately with other beds of an entirely different character. That is, a certain kind of fossils may be found *interbedded several times* with fossils of some very different "age" in a set of beds which have obviously never been disturbed. These things are especially hard to explain on the basis of intrinsic time values for the fossils.

These phenomena go under various names. Barrande in 1852 called them "colonies." H. S. Williams called them "recurrent faunas," while E. O. Ulrich terms them "periodic emigrants," and gives two examples where such out-of-place fossils are found repeating themselves no less than five times, and one where they are repeated three times. The black shales named "Chattanooga" are found *"interfingering"* with the "Rockwood" gray clays, in eastern Tennessee, which is another way of describing the same phenomena. A sort of

[5] Id., 1890-91, Vol. V, Part D, p. 52.

rhythmic alternation of deposits repeated over and over again is one of the most common of all geologic facts; and if the fossils do not have intrinsic time values, they might be expected to recur in what seems like a complete jumbling of the evolutionary order. And this is exactly what I mean. In some descriptions of the Alps and other mountains we find mention of *"wedges"* of one kind of beds in among distinctly different beds.

I shall give only one detailed example:

"The strata could scarcely be supposed to have been really inverted, save for the evidence[?] as to their true order of succession supplied by their included fossils. . . . Portions of Carboniferous strata appear as if regularly interbedded among Jurassic rocks, and indeed could not be separated save after a study of their enclosed organic remains."[6]

Men must have an unquestioning faith in their theory when they write in this way.

V

In my two larger works on geology I have given somewhat detailed accounts of some of the cases in which so-called "old" rocks are found on top of so-called "younger" ones over very wide areas. The two sets of rocks look perfectly natural; they appear as if actually deposited in the order in which we find them. They are so natural that they even seem to be perfectly *conformable,* and as one writer puts it, in describing the case near Banff, Alberta, the line of contact between the upper and the lower "acts exactly like the line of contact between two nearly horizontal formations." But because the upper beds may (as in this locality) contain trilobites or some other "index" fossils of the Paleozoic, while the underlying strata contain dinosaur bones and other fossils of the Creta-

[6] Archibald Geikie, "Textbook of Geology," 4th ed., p. 678. London: Macmillan & Company, 1903.

ceous, the evolutionary geologists look upon them with amazement, and tell us with sober faces that the upper ones must have been lifted up from deep down in the ground and pushed bodily over into their present position.

These phenomena, like those just precedingly described, go under various names in the geological literature. In the early days of the science, they used to be explained as due to *overthrust folds;* and hence Dana spoke of a case in the Alps where one such fold "has put the beds upside down over an area of 450 square miles."[7] But this explanation has now been quite generally abandoned; for one thing, the fossils in the upper beds were not upside down, and there was no physical evidence that the strata had been inverted. Recently they are more generally called "thrust faults," and the picture is that the beds were lifted up and pushed bodily over into the position where we now find them. They are also called "low-angle faults," to distinguish them from ordinary or "normal" faults, which are nearly perpendicular. The others are approximately horizontal, like ordinary bedding planes, which, of course, I believe them to be.

The Swiss geologists now usually designate them as nappes, which means sheets. And the books on the geology of the Alps are full of this "nappe theory;" for the Alps and all other mountains which have been adequately examined are found to be full of examples of the strata (or the fossils) in what are regarded the "wrong" order of sequence. Hence, as the theory of a precise sequence of the fossils is a sacred cow which must be guarded and protected at all costs, all sorts of wonderful movements of the mountains have to be invented to explain how these strata got into their present anomalous position.

The example with which I am personally most familiar is the large area in Alberta and Montana, comprising the whole

[7] James D. Dana, "Manual of Geology," 4th ed., p. 367. New York: American Book Company, 1895.

of the Glacier National Park, and running up to the Yellowhead Pass in Alberta. The region around Banff is known to many tourists, as is also the Crowsnest Pass somewhat farther south. And of course the Glacier Park on the United States side is also well known. This Alberta-Montana district comprises several parallel ranges of the Rockies running north and south, with several troughs or valleys between them; but the main body of all the mountains is Paleozoic limestone and quartzite, while the valleys in between and all the surrounding plains on the east and west are Cretaceous.

To make matters worse, the strata in the mountains are generally about horizontal, or no more disturbed than one would expect to find in an area of this size; for it is about five hundred miles long and thirty or forty miles wide. Geologists have made pilgrimages from all over the world to see it, and after seeing it they have seemed dazed at the extent of the "upside-down" area, and the very "natural" condition of the beds, though in an order so contradictory of the entire scheme of organic evolution.

I have described this area in so many of my other books that I shall not here repeat the matter again. It will be better to give, rather, some other examples, which will be in addition to the many spoken of in such books as "The New Geology" and "Evolutionary Geology."

Several hundred miles farther south is the so-called Heart Mountain thrust of Wyoming, which has been attracting considerable attention because of the close study of this locality in preparation for the Shoshone Reservoir, at the junction of the North and South Forks of the Shoshone River, just east of Yellowstone Park, Wyoming.

I quote from a recent paper by Dr. E. H. Stevens, of the Colorado School of Mines:

"The present remnants of the Heart Mountain thrust sheet are in an area about thirty-six miles north and south and about twenty-

four miles east and west. The town of Cody, Wyoming, is located about the middle of the eastern edge of the area."[8]

This author admits that all the study so far has failed to disclose proof of the mechanics of the thrusting or of the direction of the movement, though he inclines to the opinion that movement was from the southwest, and that gigantic earthquakes moved the earth suddenly *out from under this area,* leaving this area behind, much as one might jerk a paper suddenly from under a book and leave the book in almost its former position because of its inertia. He makes this suggestion because about every other thinkable theory has been tried, such as that they were transported by glaciers (for some of the smaller detached peak caps) or that they were fragments of a gigantic explosion, or that some of them were a sort of circular fault "punched up through" the underlying Tertiary (Wasatch) formation.

I am reminded of a statement repeated to me by an eminent geologist in the University of Zurich, Switzerland. I had recently visited the William Tell country, and while on Lake Lucerne I had an excellent view of the mountain called the Great Mythen, with the Little Mythen alongside. This mountain is called by evolutionary geologists the greatest puzzle of the Swiss Alps. Even at a distance of many miles the yellowish-red rocks of the top portion can be easily distinguished from the ones below, the base being Eocene, the lowest division of the Tertiary, while the cap of the mountain is Upper Cretaceous, with some bands of Jurassic and Triassic in between to add to the perplexity. The gentleman I was talking with repeated the puzzlement of another distinguished geologist, that he did not know where the top of this Mt. Mythen had come from, unless it came down from the moon.

Dr. E. H. Stevens, whom I have quoted above, remarks in

[8] *Bulletin of the Geological Society of America,* August, 1938, pp. 1233-1266.

an earlier paper that he had been led to make a study of this area in Wyoming, because the "section of strong rocks in the thrust plate is too thin (1,500 feet) to transmit powerful stresses over long distances."[9] The distance involved here is at least thirty miles. So he suggests that the bottom was jerked out from under this area, leaving it sitting on an entirely different foundation. And yet he acknowledges, after much later study of this area, that he could not find any physical evidence in proof of the mechanics of the thrusting or of the direction of the movement. Obviously, the contact line between the upper and the lower formations seems to all appearance like the *ordinary stratification plane between two ordinary formations,* as we have already seen is the case all over the Alberta-Montana region, where the Paleozoic Rocky Mountains rest in good conformity upon the Cretaceous.

Verily, the faith of geologists in this theory is one that can move mountains.

About every important region on earth which has been at all adequately examined geologically has shown some of these "wrong" conditions of the rocks. The reason why so many more examples have been reported from mountainous districts is that such areas usually have the beds more easily seen, and such areas have been more fully examined geologically. There are probably just as many examples proportionately in other regions which are underground or not so openly displayed for our examination.

The southern Appalachians were long ago described as having wonderfully constructed "overthrusts," and the same is true of the extreme northwest part of Scotland. The Salt Range in India has Cambrian resting on Tertiary, and a somewhat similar condition prevails around Simla, the vacation home for so many government officials. But almost every

[9] *Journal of Geology,* August-September, 1936, pp. 729-736.

region of the globe shows similar conditions of the stratified rocks in an order of sequence contrary to the accepted evolutionary order.

W. W. Watts, the English geologist, has this to say about these evolutionary puzzles:

"The problem of the overthrust 'nappes' of mountain regions is one of our greatest difficulties, and all explanations hitherto proposed are so hopelessly inadequate that we have sometimes felt compelled to doubt whether the facts really are as stated. But the phenomena have now been observed so carefully and in so many districts that any real doubt as to the facts is out of the question, and we must still look for some adequate method by which the overthrusting could have been brought about."[10]

An editorial in *Nature* has this to say about the many fantastic diagrams made to "explain" the conditions in the Alps:

"The attractiveness of the *nappe* theory depended upon its seductive simplicity. The alternative explanations are often complex. When, however, the theory is followed into details, the simplicity disappears, owing to rapid changes in the hypothesis, extreme differences among its supporters, its evasiveness of crucial tests, and fantastic explanations introduced to explain special cases."[11]

In the summer of 1926 I spent considerable time in Switzerland, visiting all the chief places of geological interest, also the leading educational institutions and the museums. The Swiss have long been keenly interested in theoretical geology, and the teachers of the science make a practice of giving their students a free hand in making diagrams of how the various tops of the mountains got where we now find them. The idea seems to be that if everyone makes a try at working out an explanation of the conditions, someone is going to hit on the right one, the one that will make some sense. I came away almost loaded up with these

[10] Annual Report of the Smithsonian Institution, 1925, p. 283.
[11] *Nature*, June 29, 1929, p. 975.

wonderful diagrams made by students and teachers, no two of them alike for the same mountains, and all of them quite unmindful of the most elementary principles of mechanics. I still have two or three dozen of these geological diagrams, which are fearfully and wonderfully made.

Personally I don't take much interest in theories about how the Matterhorn and its satellite mountains have traveled some wondrous distance to their present location; for they are mostly gneisses or schists, and nobody can prove that they were ever fossiliferous. The Dents du Midi and the Diablerets are made of stratified beds in the "wrong" order. But it is in the Glarus district of eastern Switzerland and in the mountains around Lake Lucerne that I found some of the most spectacular puzzles for the evolutionary theorists.

Near the southeastern end of Lake Lucerne is the old town of Altdorf, famous as the home of William Tell. From here an automobile road leads up over the Klausen Pass to the canton of Glarus. As I am not here describing beautiful scenery, I shall not pause to portray what is to be seen along this route. But the Glarus mountains and valleys have been described here by Escher and Heim in 1870, when the contradictory order of the rocks first began to be realized. There is some variation in Glarus, but the usual condition is that the valleys are Tertiary, while the mountains around them are Jurassic, Cretaceous, or even Permian. But any field worker, if he didn't know what the experts had decided about the fossils, would never suspect but that the strata are in the "right" order, or just as they were laid down.

VI

I fear I have wearied the reader with all this detail. We were studying the great variety of sequences in which the strata (fossils) occur here and there, in contrast to the theory of the "invariable order" in which they are supposed

to occur. How much longer this fable about an "invariable order" of the fossils can last, I do not know.

But we need to recall that it is by making use of these "index fossils" from here and there over the globe, placing some in one age and some in another, that the total of these differential ages makes up the colossal sum of a thousand million years or more. *No single set of phenomena in any particular locality demands any great length of time.* Niagara can easily be accounted for in a few thousand years; the Grand Canyon could have been formed almost overnight, if all the strata were still soft, with a deep fault running through them, and a good quantity of water came along to clean out the channel. The prodigious erosion shown in the Alps or the Rockies would not require any great lapse of time, if snow and ice began to be piled up on underlying soft strata, with the latter ultimately washed away in places by the floods generated by the melting of the ice and snow. In short, if there really was a universal flood, by which all the fossils were buried at approximately the same general time, and if erosion took place both during and immediately after the flood in soft or unconsolidated strata, then no unreasonable length of time is required to understand practically all the phenomena which we find recorded in the rocks.

But evolution requires time, and plenty of it. It requires also a reliable history of animals and plants in a definite order throughout many millions of years; for without this scheme of successive fossil types in a sure relative order, how can any scheme of development be made out? To spoil this scheme of an invariable order of the fossils, not only spoils the outline or the framework of alleged history on which every scheme of evolution must be built, if it is to be made to seem reasonable, but it also destroys the *other* very important factor for evolution—namely, the *many millions of ages* during which plants and animals have been living on the earth. The great lapse of time is just as es-

sential for evolution as is the definite sequence of the fossils. But the flood does away with *both* at one and the same time. If there actually was a flood, then there can be no validity to the geological "ages," and the "short" chronology instead of the evolutionary chronology is what we have to accept.

VII

I wish here to show how these matters appear to a modern scientist who has gone over without prejudice what I have been presenting for so many years. Dr. George Barry O'Toole, now professor of philosophy in the Catholic University of America, published a book of 400 pages in 1925, entitled: "The Case Against Evolution." In it he gives some very acute criticism of the theory from the biological point of view, but when he comes to deal with the geological argument he follows my books for about 40 pages, quoting freely from them and *in extenso*. He acknowledges that Price has been attacked and villified by several prominent geologists, but he says:

"It is Price's merit to have shown that, in the light of recently discovered facts, such as 'deceptive conformities' and 'overthrusts,' this objection [against the time value of the fossils] is far graver than it was when first formulated by the authors in question."[12]

The authors referred to in the latter part of this sentence are Huxley and Spencer, whose strictures against using the fossils as evidence for the age of any given set of rocks I had repeated in some of my books on geology which Doctor O'Toole had read.

But here is the way this author sums up the case against the fossils as tickets proving the age of a rock deposit:

"Certainty, therefore, with respect to the comparative antiquity

[12] George Barry O'Toole, "The Case Against Evolution," p. 98. New York: The Macmillan Company, 1925.

of the fossiliferous strata is the indispensable presupposition of any paleontological argument attempting to show that there is a gradual approximation of ancient, to modern, types. Yet, of all the scientific methods of reckoning, none is less calculated to inspire confidence, none less safeguarded from the abuses of subjectivism and arbitrary interpretation, than that by which the relative age of the sedimentary rocks is determined."[13]

After following my line of objections to the scheme of the geological "ages," he gives another summary of the logic of the situation:

"The paleontological argument is simply a theoretical construction which presupposes evolution instead of proving it. Its classic pedigrees of the horse, the camel, and the elephant are only credible when we have assumed the 'fact' of evolution, and even then, solely upon condition that they claim to approximate, rather than to assign, the actual ancestry of the animals in question. In paleontology, as in the field of zoology, evolution is not a conclusion, but an interpretation."[14]

This statement is far too easy on the alleged "evidence" of the evolution of the horse and other animals. For the history of the way this "evidence" has been used proves conclusively that the facts have been shamefully manipulated to make them seem to prove the case desired. I have shown this elsewhere.

Dr. Louis T. More, one of the most judicially minded of our contemporary men of science, gives about the same estimate as O'Toole of the strongly subjective element in the matter of the fossils as evidence for evolution. I quote from his summary of the case about the fossils in his lectures before Princeton University:

"The more one studies paleontology, the more certain one becomes that evolution is based on faith alone; exactly the same sort of faith which it is necessary to have when one encounters the great mysteries of religion."[15]

[13] Id., p. 93.
[14] Id., p. 126.
[15] Louis T. More, "The Dogma of Evolution," p. 160. Princeton University Press, 1925.

Unfortunately, this sort of faith is based on something quite contrary to the word of the Creator of the heaven and the earth. It would seem to be much more like a theophobia than a theologia.

Professor F. C. S. Schiller, of Oxford University, is one of the world's best-known writers on logic; one of his books, "Logic for Use" (1930), is a work of 469 pages. For several years he has regularly commuted between Oxford and Southern California, spending the winters in the land of New Year's roses and orange blossoms. Once while in the latter place he read my "Geological-Ages Hoax" (1931), concerning which he wrote me (in part) as follows:

"I found your contention interesting and a beautiful illustration of the possibility of putting an alternative interpretation on even the best-established 'facts' (which always contain 'theories')."

And this brings up the matter of the subjective human element which always enters into all scientific work, even the best and the most unbiased. Scientific men are only human, often all too human. Even their records of "facts" cannot always be trusted at full one hundred per cent. Schiller says that even the best-established "facts" always contain "theories" in their recording or reporting by poor human beings. But this very true principle has been almost entirely overlooked by the world at large, who have so universally been willing to trust the dicta of eminent scientists when in direct conflict with the records of the Bible.

But this statement about the subjective element pervading all scientific work is not alone. The following is from Alfred North Whitehead, of Harvard:

"The history of thought shows that false interpretations of observed facts enter into the records of their observation. Thus both theory, and received notions as to fact, are in doubt."[16]

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[16] A. N. Whitehead, "Process and Reality," p. 13. New York: The Macmillan Company, 1929.

And again from the same author:

"Every scientific memoir in its record of the 'facts' is shot through and through with interpretation."[17]

In view of these very candid admissions on the part of such eminent scholars and sober thinkers, how can anyone dare to trust his views about the age of the world to the keeping of even the most eminent of scientific men, when these flatly contradict the records of the word of God?

VIII

In closing this chapter I wish to say that we are in danger of expecting too much of a positive nature from science regarding such a problem as this of the length of time that animals and plants have existed on the earth, or even the length of time since what we call the flood took place. In the very nature of things, all we should expect is that no positive facts should exist which, when properly interpreted, are not harmonious with what we believe *on faith.* (Creation and everything connected with it must always be matters of revelation, and hence matters of faith.) True, we can learn the truth of creation by the default of science at its very best in explaining the origin of anything. This default of a scientific explanation does prove creation, but only for those who have received this great truth in some other way, that is, through a divine revelation. I very much doubt if any convinced nonbeliever would become converted to the idea of a literal creation from the data of science alone.

But these facts of science do assist our faith, the faith which we as Christians hold on other grounds. In this way it is correct to say that these modern discoveries do vindicate the record of Genesis. But we are in danger of expecting too much from discoveries of modern science.

[17] Id., p. 22.

They have their place; they are valuable. But they are not the grounds on which we believe in Genesis. The latter is a revelation from God; and we believe it because God has spoken. This is and always must be the best ground for believing.

CHAPTER NINE

Was There an Ice Age?

I

THE evidence that the earth once enjoyed a mild, springlike climate even in the extreme north polar regions, is clear and abundant. Leaves of dozens of kinds of semitropical plants and trees occur in northern Greenland and in nearly all the lands around the North Pole. These could never have drifted from any distance; for they would all have gone to pieces. Semitropical animal remains also occur, such as those of large reptiles. I remember seeing in the museum of the University of Upsala, Sweden, a large showcase full of such remains which had been found in Spitzbergen, ten degrees from the pole. Abundant coral rocks also occur in various parts of the Arctic; and corals require warm ocean water in which to grow, and it is absurd to think of coral remains' having drifted into their present position. From all this evidence it is indisputable that the polar regions were once mild and warm.

The Antarctic has not been so well examined geologically; but there is similar evidence there also. And as there is no good evidence that the poles ever were anywhere else, the evidence is conclusive that the entire earth must have had a mild, equable climate. And those who accept flood geology believe this mild climate to have prevailed without a breakup to the time of the flood.

But there is also evidence of another sort. Plenty of reindeer and musk-oxen bones have been found in southern France and northern Spain, with those of other Arctic animals. In America caribou (American reindeer) and musk oxen occur as far south as Utah and Oklahoma and Pennsylvania, while walrus bones are plentiful in New Jersey. As all these fossils occur in the uppermost or most superficial deposits, the inference seems reasonable that they represent a period *after* the flood when extremely cold conditions extended far to the south of their present boundaries. Many kinds of sea shells furnish evidence which appeals more especially to experts; but taken all together there seems strong evidence for the prevalence of a cold climate after the flood for a considerable length of time.

I have no confidence whatever in the reported findings of the "polar" bear and the so-called "cave lion" and other "cave" animals as evidence of a cold climate; for by the bones alone (which are all we have in the case of the fossils) no one can reliably distinguish the polar bear from the other bears, or one type of lion from another. Indeed, some of the very best authorities tell us that all the bears ought to be classed as one single species with four or five varieties. Some others of the mammals found in the "glacial" deposits may be better indexes of cold climate. At any rate, the abundant remains of the reindeer in Spain and France, with profuse numbers of drawings of the animal on the walls of grottoes or caves in these places, seem conclusive to me that the climate must at that time have been much colder than at present.

II

The physical evidences for continental glaciers have been enlarged upon *ad nauseam.* Practically all of the writings along this line, whether in government "Reports" or in the college textbooks, are shining examples of *non sequiturs* and

of how *not* to write on scientific subjects. Boulders and even underlying rock may be scratched by other agencies than continental ice, and conglomerates and heterogeneous masses of clay and gravel ("boulder clay") can be made by water in a hurry, as well as by glaciers.

F. H. Lahee is candid enough to say:

"Even in water-laid materials, sedimentation may be too rapid for sorting. Thus, alluvial-cone gravels at the base of a steep mountain range may have very rude bedding, and may even closely resemble *till*, so poorly defined are the strata."[1]

It is utterly unscientific for certain geologists to assume that they can always and infallibly distinguish the work of glaciers in forming deposits with no discernible bedding, from the very similar deposits made by rapid waters. Grabau testifies on this point:

"In the talus region [of formations near mountains] the material will not only be coarse, but the blocks will for the most part be angular. Often the structure is suggestive of morainal accumulations. Large and small, round and angular blocks abound in the sandy ground-mass with total absence of sorting, the result of the indiscriminate piling together of the material by the tremendous flood rains of the desert. The evidence of violent impact is further shown by the abundance of concussion marks and the total absence of the woody vegetation, which is ground to fragments and washed away by the floods."[2]

Of course, not only will the torrential rains of arid regions produce these effects, but *any* violent action of water is capable of the same. This effectually disposes of the so-called "glacial" till, or the mixture of clay and angular fragments, which has so often been depended upon as prima-facie evidence of continental glaciers.

James D. Dana extends the doubts to other physical features of the "glacial" phenomena:

[1] F. H. Lahee, "Field Geology," p. 57. New York: McGraw-Hill Book Company, 1931.
[2] A. W. Grabau, "Principles of Stratigraphy," p. 542. New York: A. G. Seiler, 1924.

"Moreover, with regard to traveled material or drift, the question is always to be asked whether water or floating ice may not have been the transporting agent."[3]

It is admitted by all that the region now most extensively covered by ice is in the Antarctic. Here is the region where the work that glaciers are capable of on a continental scale ought to be displayed in a very convincing way. And yet those who have studied that part of the world have had their former extreme views greatly modified by what they discovered there. A review of two works, one by C. S. Wright and R. E. Priestly ("Glaciology," British Antarctic Expedition, 1910-13), and the other by Griffith Taylor ("The Physiography of McMurdo Sound"), gives a summary of the results. I quote from a review of these two books in *Nature:*

"One significant feature in both works is their evidence of the trend of opinion to a more moderate view of glacier action than was in vogue some years ago. Dr. Griffith Taylor states that he formerly inclined to the views of Professor W. M. Davis as to the extreme vigor of glacial erosion. As a result of his Antarctic studies, however, he remarks that his 'views have swung backward from the extreme opinion of those who credit ice alone as the chief agent in the sculpture of a glaciated region, to the view that ice plus water is the effective agent.' The three authors give their weighty support to those who agree with Professor Garwood that glaciers protect the underlying land. Messrs. Wright and Priestly state (p. 231) that 'with the suggestion that at the present time the Antarctic mantle, considered as a whole, exercises a predominantly conservative influence, the writers are in accord.' "[4]

Additional facts gleaned from these two books by the reviewer are: "Moraines in the Antarctic are therefore surprisingly scanty." Also: "The Antarctic barrier ice does not support the view that unbroken sheets of land ice can pass over deep sea, such as the Norwegian Trough" from Scandinavia to Germany and England. It is also stated: "The evi-

[3] James D. Dana, "Manual of Geology," 4th ed., p. 942. New York: American Book Company, 1895.
[4] *Nature*, March 22, 1924, pp. 417, 418.

dence from Antarctica is therefore in favor of the subaqueous and not of the terrestrial origin of boulder clay."

This latter statement is especially significant. It means that till, or boulder clay, *was not formed by glaciers at all,* but by water in violent motion—a view which fits nicely into the picture of flood geology, and removes almost the last supposed evidence for continental ice sheets.

III

Other outstanding facts which are always associated with the theory of an ice age, but which fit far better into the theory of flood geology, with a short but real period of cold immediately following the flood, may be considered briefly. A mere outline of the facts is here possible; the details may be found in any good geological textbook, or in the writer's various works along this line.

Extensive deposits of sea shells, bones of whales, starfish, etc., occur in various parts of the world at elevations of many hundreds of feet, often near the headwaters of the rivers, or high up above inland lakes. These are strictly *superficial* deposits, and indicate that in all these widely scattered localities the ocean waters only recently, geologically speaking, subsided to their present position. Elevated old strand lines around all the continents are of a similar nature in their meaning.

All the rivers of all the continents give evidence that formerly they flowed at considerably higher levels, and contained thousands of times their present volumes of water.

As there is no known agency but *standing water* which can smooth out wide stretches of level surface like the prairies of North America, the pampas and llanos of South America, and the steppes of Russia and Siberia, we should add these regions to the wider river bottoms; for they are related phenomena.

All the great desert regions of the world are interior

basins, rimmed around on most sides by mountain ranges or high plateaus which serve to rob the winds of their moisture. All winds which descend from a higher level are compressed and thereby both heated and dried, so that the winds which flow over into these monstrous saucerlike basins are almost always arid and warm, still further desiccating the lands within these basin areas.

In the midst of all these interior basins are lakes or inland seas, some of the dry parts of the basins even descending below the level of the ocean. In the desert regions of Asia are the Dead Sea, the Aral Sea, and the mighty Caspian which has an area about twice that of all the Great Lakes of North America combined. Its surface is about eighty-five feet below the level of the ocean, and the huge basin in which it is situated was once much fuller of water and has been called the Sarmatian Ocean. Great Salt Lake is the dwindled remnant of a large prehistoric lake now called Bonneville, while to the west the many small lakes of Nevada are the relics of what is called Lake Lahontan, which once occupied the larger part of the State of Nevada.

J. Claude Jones, professor of geology in the University of Nevada, who made a detailed study of these prehistoric lake remains, concluded that the maximum extent of the lake does not date back more than two thousand years. On the freshness of the marks of the lake he says:

"All of the physical evidence points to the recent existence of the old lake. The terraces, bars, and other lacustrine features are today practically as fresh and unchanged as when they were first formed by the lake waters. Instrumental determination of the elevation of the high-water level over the entire basin, with the exception of Walker Lake, showed that the shore lines had not suffered any deformation whatever. As the mountain ranges of Nevada are bounded by faults on one or both sides and movement is still in progress along certain of them, it is surprising that there has not been some change in the elevation of the lacustrine beaches.

"With the exception of an occasional scarring of the terraces by

cloudbursts, there has been practically no erosion of the beach lines. In only a few localities have the lake sediments been covered by wash from the surrounding hills, and then only to a depth of one or more feet. In brief, all the evidence bearing on the age of the former lake seems to clearly indicate that the history of Lake Lahontan has all taken place within the past few thousand years."[5]

This same author points out that the fossil elephants, horses, camels, and lions found in the lake sediments are extinct and similar to those occurring in the La Brea tar pits and elsewhere; and *therefore we must revise our ideas of the great length of time since these animals inhabited North America.* I quote his words:

"The most startling result of the limitation of Lahontan history to recent years is found in connection with the fact that many of the animals found in its sediments are extinct or no longer exist in the region, and it will be necessary to change present conceptions of the length of time necessary to radically alter a mammalian fauna."[6]

But all of this is wonderfully within the picture of the past of the world as given by the Bible record of the flood. For when the flood receded, all these immense interior basins, comprising nearly one fourth of the entire land surface of the globe, must have been full of water. Thereafter a slow drying up of these great lakes took place, with a gradual desiccation of the climate of all the regions surrounding them. Even to the time of the Romans, let us say, there were probably considerable quantities of water still remaining in many of these basins, which are now arid deserts. But as time went on, the drying of the lakes and the aridity of the climate in all the bordering lands became more and more complete; and now these vast regions are impossible of permanent habitation by man, except on the most precarious of circumstances for a limited time only. And these conditions extend all around the globe.

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[5] "Quaternary Climates," "Geological History of Lake Lahontan," p. 50. Washington: Carnegie Institution, 1925.
[6] Id., p. 40.

IV

From the record in the Bible, it is clear that some very large and important geological work must have taken place at the close of the flood and shortly thereafter. A wind is mentioned (Gen. 8:1) as the chief factor in the lessening or subsidence of the waters. That this must have been a most extraordinary "wind" is self-evident; otherwise it would never have been important enough to mention in such a connection. But the sudden change of climate in the northern regions, with an ocean of water *still warm,* all taking place at the beginning of one northern wintertime, and the changed conditions being carried over *until the beginning of another northern winter,* could not fail to produce winds of extraordinary violence. For these are just the conditions to produce violent currents of the atmosphere. And these strong winds could not fail to produce very profound changes in all the shallow seas around the emerging or recently emerged lands. For the latter were composed of sediments which were still soft and unconsolidated, and would be subject to enormous changes when violent wave action was brought to bear upon them.

Think, too, of the mountains in many parts of the northern and southern regions, where snow and ice remain even now for several months at a time. But soon after the flood, the sediments on these elevations were all soft and freshly laid, and would necessarily be subject to enormous erosional effects, and to prodigious landslides, or landslips, as they are variously called. Even in modern times, there have been such occurrences as the slide of some forty million cubic yards of rock from the top of Turtle Mountain, Alberta, down across the valley for several miles, all occurring in less than five minutes. In February, 1911, in connection with the Pamir earthquake, a mass of rock materials more than three miles long and nearly three miles wide slid down about a

mile and a half, dropping nearly a third of a mile in the process, forming a new lake which four and a half years later was nearly a quarter of a mile deep and still rising. Such modern examples will help one to understand the enormous so-called moraines around such mountains as the Alps and the Rockies and elsewhere, though glaciers in the ordinary meaning of the term may have had little or nothing to do with their formation.

V

I have already mentioned the fact that over one fifth, or twenty per cent, of the earth's land surface is now occupied by great basins with interior drainage, which must formerly have been full of water. Some of these interior basins, like the long California valley, may now have an outlet, but were obviously full of water up to a very recent period. The Great Basin, as it is called, includes essentially all of the States of Nevada and Utah, with parts of Oregon, Idaho, California, and Arizona. Such ancient seas or lakes are a major feature of the entire surface of the earth; and when these immense areas were all full of water *simultaneously,* as they would necessarily be immediately after the flood, or when the lands first emerged, very profound climatic effects on all the surrounding lands could not fail to follow. The climate would be very much more humid than at present, but also *more even* in its range, that is, with much less of extremes of heat and cold.

But even more profound climatic results must have followed from the fact that the entire ocean water of the world before the flood must have been warm, and warm not only throughout the Arctic and the Antarctic regions, but warm from surface to the most profound depths. For that antediluvian world had nothing to cool the deep ocean waters, such as we now have at each of the poles. But the flood was a comparatively brief affair, lasting only a little more than

a year before at least a part of the lands near the eastern Mediterranean emerged above the waters, though a much longer period may have elapsed before the entire continents were elevated as they are now. But from all this it is clear that many years, possibly several centuries, must have passed before the entire body of the ocean would cool off to its present condition, which is cold almost down to the freezing point, except a comparatively shallow layer on top in the warmer parts of the globe. Cold water sinks to the bottom; and the earth has two refrigerating plants at its two poles, which are very effective in cooling the ocean and in keeping all the deeper portions chilled almost to the freezing point of fresh water. But in the world before the flood the entire ocean must have been warm throughout instead. And after the flood, so long as any of this original warmth remained in the ocean water, this warm water would *float on top,* and could not fail to have very profound climatic effects everywhere.

The Mediterranean never has completely cooled. Though nearly as deep as the Atlantic, its bottom temperature is 55° F., with essentially the same temperature throughout, or from top to bottom. It is walled off from the deep cold waters of the bottom Atlantic, its only communication with the latter being at the shallow Strait of Gibraltar, where the surface Atlantic water of about 55° F. is constantly flowing in, to supply the evaporation constantly going on, with no large rivers except the Nile to make good the deficiency. On the other hand, the Atlantic (and also the Pacific) has two refrigerating plants, one at each pole, which keep up a constant supply of cold water, keeping the bottom water of all the deeper oceans at about its maximum point of contraction, which is slightly above the freezing point. But the shallow Strait of Gibraltar keeps this icy water from getting into the Mediterranean, with the result that the temperature of its bottom water is only about twenty degrees cooler than its surface water, which is around 75° F., which is several

degrees warmer than the warmest surface waters of the Atlantic in this latitude.

As other walled-off seas show about the same general facts, the Gulf of Mexico, the Sulu Sea, the Japan and China Seas, it is reasonable to conclude that the comparatively warm bottom waters of these are an indication of what the entire ocean water once was like before the flood, with its consequent derangement of climatic conditions.

VI

One more general fact needs consideration here: it is that there is clear evidence that for a considerable period after the flood the climate of all the world was *much more humid* than at present. This would follow deductively, when we consider the great interior basins which were then full of water, and when we take into account the warm, steaming oceans. But this more humid condition of all the lands is also proved from the abundant remains of ancient (but post-diluvian) vegetation in many lands which are now so dry as to be uninhabitable.

On this point I shall quote from Sir George Simpson in a recent paper, to which I shall have occasion to refer again presently.

Says Simpson:

"Practically all deserts such as the Sahara, Libyan, and Kalahara, show signs of water action in relatively recent times, and many of them are littered with the flint tools of prehistoric man, showing that in the latter half of the Pleistocene Period they supported sufficient animal life to make them good hunting grounds."[7]

The "latter half of the Pleistocene Period," as mentioned here in terms of the popular evolutionary geology, means for us the period considerably later than the flood, and the "signs

[7] Annual Report of the Smithsonian Institution, 1938, p. 294.

of water action" referred to include the many dry river channels and dry lakes which are found all through the large desert regions of the world. Anyone familiar with the arid western part of the United States knows what I mean; but the Sahara and all the other deserts of *the entire world* exhibit the same phenomena, often on a much larger scale.

The so-called "Dry Falls" of the old Columbia River, near the Grand Coulee Dam in the State of Washington, constitute a good illustration of former conditions vastly different from the present. Here is an old channel of the mighty Columbia, which geologists say was caused by the "glacier's" diverting the river from its true course for a time, the river afterward returning to what is its present channel. This temporary channel resembles the Niagara in some respects; for the river had a set of falls which traveled upstream as the Niagara did, leaving also a gorge below. Suddenly the river stopped flowing here, and returned to its present channel, leaving this fossil river, if I may so call it, with what is one of the most Gargantuan geological spectacles that I know of in this old world. These Dry Falls are twice the height of Niagara and about three times as wide, while the Columbia when flowing here must have carried as much water as the Mississippi.

As for the time when this diversion of the Columbia occurred, or rather the *two* diversions, if the common interpretation is correct, it is anybody's guess; but this old channel was occupied by the Columbia obviously since the flood, and the abandonment of the Dry Falls *may* have taken place long since the time of the pyramids of Egypt. And many of the dry river channels and dry lake basins of the deserts of the world may have been full of water at the very same time, or even later.

By secular chronology as well as by that of the Bible, the period of Hammurabi and his contemporary Abraham is pretty well fixed around 2000 B. C., and is not likely to

be much changed by any subsequent discoveries. But at this period a district south and east of the Dead Sea is spoken of as "well watered everywhere" (Gen. 13:10), which is now a barren desert. Similarly all the region south of Palestine, now an almost uninhabitable wilderness, is studded with abandoned towns and cities. These incontestable facts are objective proof that these regions have become arid within the time of well-established history.

I do not think that any human being is capable of definitely settling the chronology of the flood or of the exact age of the world. I consider that if God had wanted men to know these matters, He would have given us more definite data on which to compute them. Probably one reason He did not see fit to do so, is that men would then almost certainly have indulged in speculations about the end of the world which would seem more plausible and more deceptive than those we already have.

But on the other hand, I have no sympathy whatever with certain speculations, based on alleged scientific evidence, which would extend the human period backward to twenty-five thousand years, or even to half this length. One of the leading advocates of flood geology has been misled on this point. But I consider all the reliable scientific evidence to be in harmony with a reasonable and straightforward acceptance of the Scripture statements on these matters. If man actually existed on this earth twenty or thirty thousand years ago, then we would be obliged to say that there was a period of much more than half this amount of time *with nothing to show for it* in history, that is, with an *absolute blank* in the Bible records for all this time. And that is something which we cannot admit. (See Appendix, Note 5.)

But I do not consider it necessary to try to settle all these problems. We should be satisfied with the obvious harmony between the Bible and all reliable science with respect to these matters.

VII

There is evidence which cannot be disputed of the contemporaneousness of man and a semi-Arctic fauna in certain parts of central Europe. For instance, at Predmost, Moravia, is a monstrous accumulation of bones which for centuries has been resorted to for fertilizer. Here occur the bones of reindeer, elk (moose), musk ox, banded lemming, chamois, glutton, and elephant ("mammoth"), with bears, wolves, and lions. It is evidently an old dump heap, or hunters' "kitchen midden."

In this great pile of bones was found a large tomb, 4 meters long by 2.5 meters wide, bounded around with huge stones and gigantic bones and roofed in with stone slabs. Twenty or more individual human skeletons were found here, most of them in the contracted or doubled-up position common to those ancient forms of burial.

More than 900 separate specimens of the elephant (mammoth) have been identified from this collection of bones, and they include animals of all ages from mature or old ones down to a very young calf. As if to clinch the proof that man and these animals were contemporary, there was also discovered a small statuette or carving of a mammoth carved out of the elephant ivory. The sedimentary deposits associated with this locality, and the loess, prove conclusively that the whole is postdiluvian, though of course very ancient.[8]

Here, then, is evidence of human beings (of a low type physically and mentally) who lived contemporary with semi-Arctic animals, and with the elephant, in central or eastern Europe in postdiluvian times. Whatever theories we adopt regarding the climate and the distribution of animals and human beings after the flood, must take these facts into consideration.

[8] See W. J. Sollas, "Ancient Hunters," pp. 454, 509. London: Macmillan and Company, 1924.

VIII

To discuss the antediluvian climate and the profound changes accompanying the flood, would require much more space than we have here. But the warm air before the flood would hold large amounts of water vapor; and one of the changes then occurring was the sudden chilling of this warm, moisture-laden air, which resulted in torrential rains, though much of the geological effects of the flood resulted from the disturbance of the ocean.

As the flood began on the seventeenth day of the second month, primitive reckoning, this would be about the beginning of our northern winter. Although the waters of the ocean were warm, the sudden chilling of the atmosphere might easily result in soon freezing much of the shallow waters, or epicontinental waters as they are called, in the Arctic regions, which might account for the many frozen carcasses of elephants which we find there. Elephants do not sink in even fresh water when dead; their carcasses, unlike those of other animals, *float* from the very first, as has been testified by African travelers. This would also help to explain why elephants seem to be almost the only animals found frozen in cold storage in the Arctic regions of Siberia and Alaska.

Of course, there is clear evidence of elephants and other animals which were hunted throughout central Europe by postdiluvian man amid what appears to have been a colder climate than now prevails there. And it is possible that some of these postdiluvian animals may have perished also farther north and may now contribute to our perplexity by being preserved amid snow and ice in some localities; but I feel confident that essentially all the elephant (mammoth) remains in Siberia and the Arctic regions are those of genuine antediluvian animals. They are much too far north, hundreds of miles north of the Arctic Circle, to be confused with those

comparatively few specimens which we find from those which lived after the flood.

I do not think it necessary to try to straighten out all the possible puzzles connected with this subject. The main facts are clear enough. The very profound changes in climate initiated by the flood would not necessarily render the European lands uninhabitable by man and the larger animals, even though the skies might for many years have been almost perpetually cloudy or overcast, with enormous precipitation in the form of rain and snow.

We are all aware of how a comparatively mild climate still prevails in Scotland and Norway, though these lands are in the same latitude as Labrador and the Hudson Bay. The chief reason is the one single oceanic current or drift, which gives even the northern part of Norway little zero weather, though its general climate may be, as someone has expressed it, "nine months winter and three months late fall."

However, I conceive the postdiluvian climate of Europe and northeastern America to have been more mild than that just mentioned, though with almost perpetual precipitation in one form or another. But this might not have seriously interfered with the life of such animals as we find in subfossil form scattered over these regions. Even elephants might have thrived there; for the vegetation would have been most plentiful and luxuriant. All the larger animals might well have multiplied and spread out over wide regions. In the Genesis account we are told that the human beings resisted the divine command to scatter abroad over the earth, but wanted to remain huddled together in one community, which the Lord had to break up by a special and terrible judgment. But it would be only the usual thing if, while men were thus disobedient, the dumb animals obeyed the call of their Creator, and spread out very rapidly to all parts of the lately desolated earth. With a mild climate still prevailing for a considerable time, and with enormous precip-

itation which would produce a luxuriant vegetation, the animals would have plenty to eat, even though we might not have liked the continuously overcast skies with their almost perpetual precipitation.

Another fact needs to be understood. For today in New Zealand, in the latitude equal to that of Rome, Italy, or northern California, the glaciers of Mt. Cook descend as low as only 400 feet above the ocean. Oranges and grapevines and tree ferns grow within sight of perpetual snow. Hence there is nothing to hinder us from picturing the elephants and other temperate-climate animals spreading into the Arctic regions, while the climate of all the lands was becoming increasingly chill, and the glaciers were rapidly growing in length down the mountain valleys of all the northern lands.

But suddenly even this was rudely interrupted. It may have been delayed until the ice had about reached its maximum, or may have occurred earlier; I do not know. But there seems good evidence that some enormous disturbance of the ocean bottom in the vicinity of Iceland, perhaps associated with the strong volcanic activity which we know has long prevailed there, sent enormous tsunamis, or what are erroneously called tidal waves, rolling over northeastern America and northwestern Europe, perhaps *in the winter-time,* and carrying thousands of masses of ice to help along the work of destruction. There is no doubt that such an oceanic disturbance, if on a scale of considerable magnitude, would suffice to account for the spreading out of what is called the Northern Drift, with the extinction and burial of great herds of animals.

I conceive that something of this sort actually took place from the vicinity of Iceland, possibly as late as the time of the building of the pyramids or the time of Hammurabi. The *time* when it occurred is not important, nor is it necessary that we should be able to figure out all the details of how it happened. It seems sufficient for our present purpose that

something of the sort did occur a considerable period of time *after the flood,* and that in this way we have a sufficient agency to account for all those phenomena which are left unexplained by the flood itself.

IX

It will not be expected that I should undertake to explain separately all the phenomena, some of them peculiar and striking, which are usually associated with the glacial epoch in evolutionary geology. Most of them will be found discussed in my college textbook, "The New Geology."

But it should be noted here that, on the basis of this second catastrophe of almost continental proportions, though of course not on the world-wide scale of the flood itself, we have *two sets of fossils and two sets of deposits* to explain in such lands as northern Europe and northeastern America. The first set (and of course the largest and the most important) are the fossils and the deposits made by the flood; while the second are those made by this second catastrophe which I have postulated above. In many localities it may not always be easy to discriminate between them; but such a separation may not be at all necessary. It may be that between the two we have an ample explanation for all the geological phenomena in any part of the world.

X

As for the causes of change in the earth's climate, we have the following honest confession by Sir George Simpson, in an address before the Royal Institution of London, just a few years ago.

"It is the problem of meteorologists to study the extent and sequence of the climatic variations in all parts of the world, and to seek the cause and mechanism of the changes. Very little progress

has been made in that direction up to the present, for two main reasons. In the first place, the geological evidence is very fragmentary and often doubtful; and secondly, we know very little of what causes climatic variations and how they are controlled."[9]

After tons of perfectly good white paper have been used in printing the fruits of misguided research on this subject during the last fifty or seventy-five years, printing done mostly at the taxpayer's expense, we now have the candid confession that "very little progress" has been made in making good, lasting sense out of the "glacial" phenomena, when interpreted on the basis of the evolutionary geological "ages," whereas, I hope to show that the whole set of facts as now known fits perfectly into the picture of flood geology as suggested first by the Hebrew Scriptures, and as taught and believed by Christian people ever since the days of John Woodward, the first to write on flood geology, a contemporary and friend of Sir Isaac Newton, who now lies buried near Newton in Westminster Abbey.

Years ago Simpson was a pioneer in proving that the earth does not act like the hypothetical "black body" of the physicists, which is warmed in proportion to the direct solar radiation which it receives. On the contrary, with an increase of solar radiation, *an increase of cloudiness results,* which prevents the further warming of the earth. Simpson states very clearly the way in which these somewhat complicated factors operate:

"In present conditions just about half the sky [of the entire earth] is covered by cloud; the amount is slightly different in the different latitudes, but not to any large extent. The clouds appear bright because they reflect the sun's light. The light which the clouds reflect cannot be used to warm up the earth; it is just returned to space, and to that extent the [effective] solar radiation is reduced. The amount of solar radiation returned directly by the clouds has been measured, and proves to be forty-three per cent of the total

[9] Annual Report of the Smithsonian Institution, 1938, p. 289.

incoming solar radiation. That is, nearly half the solar radiation which reaches the earth is intercepted and returned by the clouds without taking any part in warming up the earth."[10]

Simpson goes on to explain how the differences in temperature between the air at the equator and that at the poles tend to set up huge convection currents on a world-wide scale, by which the air at the equator expands and rises, and overflows toward the poles, where it cools and contracts and flows back to the equator. This is the general circulation of the atmosphere; all winds may be traced ultimately to it, and even the ocean currents are now regarded as chiefly due to the circulation of the atmosphere after all.

John Tyndall long ago pointed out that, in order to have an extension of glaciers, we need not so much a lowering of temperature, as a more effective system of condensation, with even more evaporation than at present. Simpson illustrated this principle objectively by having four glass jars on the stand before the audience, each jar containing a layer of water at the bottom, with a metal vessel at the top which was kept cooled by frozen carbon dioxide. Thus the jars could be made to represent the earth under varying conditions, the bottom of the jar representing the equator, and the top the polar regions. A thermometer was arranged in each, and heat was applied to the jars in varying amounts.

The object of the experiment was to show the effect of changes in the temperature of the water at the bottom of the jars, this bottom representing the equatorial regions. I shall let Professor Simpson describe the results in his own words:

"One jar (second from the left) contains water at the temperature of the room, and there is an appreciable deposit of ice at the top. By adding ice to the water in the vessel to the left, equivalent to lowering the equatorial temperature, the deposit of ice at the top is much reduced. The water in the *third* vessel has been warmed by a small gas jet, and the effect of the heating has been greatly to

[10] Id., pp. 295, 296.

increase the deposit of ice. In the fourth bottle the temperature has been raised still higher, with the consequence that the ice has almost entirely disappeared by melting."[11]

Now let us apply the results of this experiment to the condition of the earth immediately after the flood.

The world before the flood, with magnolias, grapevines, breadfruit trees, and dozens of other semitropical plants growing on the lands in the Arctic regions, and corals living in the waters near by, must have had a temperature not far below 70° or 75° F., for all the waters in the polar regions, though the temperature of the equatorial oceans was probably not much higher. The temperature seems to have been fairly equable throughout. But with no refrigerating machinery at the poles, there was no occasion for the ocean waters to be cold at the bottom; hence it is highly probable that the waters of the ocean were at least moderately warm throughout their entire depth, which in many places is deeper than the mountains are high, and the total volume of the water is sufficient to cover the entire globe to a depth of 9,000 feet or 1.7 miles, if all the inequalities of the surface were smoothed out to a uniform level.

This *great total volume* of the oceanic waters must be taken into consideration when we try to consider the sort of climate which prevailed after the flood. It would be absurd to say that the year of the flood, with the solar radiation shut out for almost the entire time, could effect very much in lowering the temperature of the ocean waters. Exact figures might be difficult to compute; but we know that water has a tremendous specific heat, or thermal inertia; that is, it resists temperature change more than any other common substance. When it is cold, it requires a large expenditure of heat to warm it up; and correspondingly, when it is warm it gives off an enormous amount of heat before it cools off.

[11] Id., p. 298, italics supplied.

Accordingly, we have a right to say that the ocean water, by its sheer *quantity,* would not cool off to its present condition for many centuries, perhaps not for a thousand years after the flood.

And what warm water remained would always *float on top.* In the meantime, this steaming warm water would have above it an atmosphere growing increasingly cold; and this combination of conditions would make all the northern lands very much like Sir George Simpson's glass jar No. 3, which produced the maximum of ice at the top. Steaming warm water in enormous volume, with cold air above it, makes ideal conditions for enormous evaporation, and correspondingly great condensation, first in the form of rain, and finally in the form of snow and hail. The latter would begin to accumulate on all the mountains, and finally the snow line would creep down lower and lower, until in much of the northern regions it would reach to or near the sea level, and thus actual glacial conditions might well prevail over large regions.

But widespread glacial conditions would not prevail suddenly. It would take a long time for these cold conditions to reach their maximum; but finally those very conditions which produced the increase of precipitation over evaporation would *begin to reverse themselves,* and the accumulated snow and ice would begin to disappear. Evaporation would decrease, which would decrease the cloud and the condensation and hence decrease the supply of snow, which, in turn, would increase the amount of sunshine getting through to the earth, thus tending to bring on an arid climate in large areas, as we have today.

Someone has well said that any adequate explanation of the former glacial conditions must also explain why they ever *came to an end.* Our theory tells the reason; for the chief cause of the oncoming of the period of ice was the original warmth of the ocean water; and as this warmth gradually

disappeared, the period of accumulated ice and snow also disappeared, leaving us with the climate as it now is.

In all this I am not inadvertently omitting the effects of volcanic dust blown high into the air by the many volcanoes which were produced by the conditions attending the flood. There is plenty of evidence to show that volcanic action was prevalent immediately following the flood, the causes of which are clear enough, but must not detain us now. And W. J. Humphreys has shown how volcanic dust, which will continue to float high in the air for months, will appreciably reduce the temperature of the earth's surface. But I consider this volcanic dust as a minor factor, not the main one, for the oncoming of cold, glacial conditions.

XI

From a due consideration of the delicate equalibrium of our atmospheric and meteorological conditions, it is obvious that the world might have a greatly extended amount of ice or of glaciers, without the life of the animals and plants now upon it being greatly changed. This will become evident from a consideration of the conditions favoring glacier formation.

Whenever more snow and ice remain from the winter than can melt in the summer, a glacier will develop and grow. In other words, the glacier is the remainder left over of the snows of the preceding winters which did not melt in the summer. It is not mere dry cold which tends to produce the glacier. The coldest region on the globe is northeast Siberia; but it has no glaciers. True, it has no very high mountains, but the chief reason is the comparative dryness of the climate. It is greater evaporation, and thus greater precipitation, plus, of course, enough cold, which makes the accumulation of snow and ice which we call a glacier.

Reliable calculations show that a drop of 8° or 9° F. in the

average yearly temperature would bring the Swiss glaciers down to the valley of the Rhone.[12] But a greatly increased precipitation would produce the same effect, even at the present temperature. A glacier which descends into a warm region like Italy or New Zealand or Southern California, may be compared to a rod of ice which is being pushed into a furnace; the distance such a rod could be pushed in before being melted would depend upon three factors: its size, the rate at which it was pushed, and the heat of the furnace. Now a greatly increased evaporation (and hence of precipitation) will increase two of these factors, the size of the ice-mass and the rate of its descent. And the warmth of the original waters would ensure this greatly increased evaporation the world over. This would be followed by increased precipitation somewhere, perhaps everywhere over the globe; for the evaporated water just can't accumulate in the skies for an indefinite period. And the rapid evaporation after the flood, of which we are here speaking, must have been universal around the world, both because of the warmth of the ocean and because of the vast areas of water in the great interior basins, which were full to the brim and at that time occupied nearly one fourth of the entire land surface of the globe.

I am not under any illusions about being able to solve all the many puzzles connected with this matter of the post-diluvian climatic conditions. But certain fundamental facts need to be kept in mind.

Evaporation and precipitation are reciprocals; the one depends upon the other. The greater the evaporation for the world as a whole, the greater must be the precipitation; for the water vapor cannot accumulate indefinitely in the upper air, it must come down somewhere and at some time. Accordingly, since there were so many large areas of all the continents occupied by great inland lakes (the interior basins)

[12] See W. J. Sollas, "Ancient Hunters," p. 7. London: Macmillan and Company, 1924.

for a long period after the flood, and since at this same time the waters of the oceans must have continued to be warm, the evaporation all over the earth must have remained at a maximum for a very long time. And these combined conditions must have resulted in enormous precipitation essentially all over the globe. Regions which are now desert must then have had an abundant rainfall.

In our modern world, there are *four* large regions with very scanty evaporation, and with consequently scanty precipitation. The two polar regions are so continuously cold that the atmosphere over them cannot accumulate much water vapor; they have very little evaporation and very scanty rainfall. Two large belts of arid climate encircle the globe, the one in the latitude of the Sahara and Arabia, the other in the latitude of South Africa and Australia. About eleven million square miles, or more than one sixth of the total land surface, is rated as arid, or desert. Except for the wide reaches of ocean involved, all four of these regions above mentioned, which in total are even considerably more than the regions called desert, contribute now but little to the moisture content of the world's atmosphere.

But in the light of the facts presented above, profoundly different conditions must have prevailed immediately after the flood. Very large parts of those regions now rated as arid or desert were then occupied by inland lakes or seas. Even in the two polar regions the oceans which were at first still warm must have sent enormous quantities of steam and fog into the air. The inevitable result must have been enormous precipitation, which in turn would mean a piling up of snow and ice in all the higher elevations, and finally the growth of enormous glaciers down the mountain valleys.

But even thus I cannot agree to the myth of continental ice sheets extending over much of North America and Europe. I know too well the ambiguous (sometimes imaginary) evidence on which this idea rests, and I also know the

strongly evolutionary bias on which the theory has been built up. For, as I have said elsewhere, *the theory was invented as a sort of mental buffer, an intellectual shock absorber, to make the transition from the geological world to the present less violent and catastrophic.* The glacial theory is still used chiefly to explain away those evidences of recent emergence of the northern lands which stare at us from almost every square mile of the continents of the entire globe, but which are rendered somewhat complicated and partly obscured by more violent action of some kind of subsequent events throughout much of North America and Europe.

In other words, the original flood records seem to be palimpsest, or written over again, by some subsequent action of the elements, a disturbance which in some localities seems to obscure the larger and older record. But the first, or original, record can still be read even throughout these so-called glaciated regions; while for the rest of the world, or the land areas of the other continents, the records of a subsiding deluge are so clear and unmistakable that they cannot be explained away.

But I see no adequate evidence for sheets of glacial ice of almost continental extent which are said to have been the cause of most of the surface features of much of North America and Europe. The geologists of England and America of a hundred years ago were confronted with all the same phenomena; and they interpreted these surface features in a much more reasonable manner as due to the ocean's having been standing over these areas, with much floating ice and stormy conditions prevailing. They called the materials on the surface of the lands which were thus affected, the *"drift;"* and I still believe that this is much the better name.

And the theory of the "drift" can be shown to harmonize with the Bible, whereas the glacial theory cannot.

CHAPTER TEN

The Timeliness of the Sabbath

I

SINCE that long-gone day over forty years ago, when I first began my studies of these problems, the tumult and the shouting have largely died away; the captains and the kings of evolutionary hosts have departed from the open line of battle, and have been installed in all the places of authority and prestige throughout the educational world. Even the strange furor over the "monkey trial" at Dayton, Tennessee, which gave rise to more telegrams across the Atlantic than any single event up to that time had occasioned, has become only a memory; and many people now wonder how such a discussion could ever have taken place. It is all so settled now, so completely taken for granted.

I have called the present book, "Genesis Vindicated." In more than a dozen preceding books I have presented what seems to me conclusive evidence that the evolution scheme is unscientific, and a misrepresentation of the real facts of science. But do I expect the world to believe me? I used to think so; I used to think that we now have such a clear case against the geological theory of successive "ages" based on "index fossils," that honest, logical people would have to admit the facts.

But I have no illusions on this point now. Man is not a logical animal. He is a bundle of passions and prejudices;

and instead of his being able to control them, they continually control him. Men of science especially think that they follow "facts;" but their biased education and their innate theophobia, or the will to disbelieve (Rom. 8:7), makes them not a whit different in this respect from ordinary mortals. Hence, they are no more able to evaluate scientific facts and evidence relating to the problem of origins, than theologians are in dealing with such problems as the Sabbath or the doctrine of the second coming of Christ. The dictum of the angel to Daniel holds true in science as well as in theology: "None of the wicked shall understand; but the wise shall understand." Dan. 12:10.

II

Scientists have an incurable habit of posing as the special devotees of "truth," completely uninfluenced by prejudices of any kind; bias and preconceptions attend the thinking of all other intellectual workers like a Nessus's shirt, but not so the followers of nature. They alone are an intellectual priesthood set apart for the search for "truth," a devotion which makes them different from all others. Such has long been the pose of the followers of Huxley, Spencer, and Darwin. These founders of the cult taught this idea openly and unblushingly; their modern followers have toned down this arrogance a little bit, but the feeling is still strong within them.

But this very assumption of immunity from prejudice, says a writer in a leading English journal—

> "being itself a preconception, disproves the claim and prevents those who hold it from seeing themselves as they are. Further, they are confirmed in their belief in their own infallibility by having become a kind of priesthood, ordained to lay down the law to the ignorant."[1]

The writer just quoted gives an analysis of why scientists

[1] London *Times* Literary Supplement, Nov. 10, 1925.

are like other mortals and become spoiled by too much praise, or become so deeply engrossed with their own specialty that they refuse to accept anything contrary to it, or anything that goes beyond what they themselves have worked out. And, like all other mortals, scientists are very easily spoiled by a little genuine success. It often takes very little in the way of personal discovery of new facts from nature to make some people think they are infallible in the interpretation of these facts, or even in the interpretation of almost everything else in nature.

But this *ne-plus-ultra* attitude is not the only cause for scientists' making blunders like other men.

"It is not only great discoveries that are subject to overvaluation. Sometimes this happens to discoveries that turn out to be none at all, but mares' nests. A too ready acceptance of the false is the complement of a too obstinate refusal to accept the true; it is the reverse side of the same medal. An instance is the refusal of one geographical society to believe in Stanley's real journey into Central Africa, and another's acceptance of Cook's apocryphal one to the North Pole. Another instance in a different field is the unhesitating acceptance of Koch's tuberculin, in 1890, contrasted with the determined skepticism that greeted the announcement of Pasteur's preventive treatment of hydrophobia and, a few years later, the serum treatment of diphtheria. The cause is the same—the inability to weigh evidence. The scientific world is constantly proving itself a bad judge of evidence."[2]

An analysis of these and other mistakes of scientists is much inclined to lead one to cynicism or misanthropy. For those discoveries which are *slow* to make their way are almost always of a nature really to benefit humanity, or to help them to understand and believe God's word; while those false ideas or "mares' nests" which spread like a prairie fire are chiefly of an opposite character. In this latter class, of course, belong the theory of organic evolution and all its many related corollaries, such as the story about many millions of

[2] Ibid.

years that plants and animals have existed on the globe. The very persistence and universality of the propaganda about the great age of the fossils has now made it seem like unquestionable truth to all "well-informed" beings throughout the civilized world.

For over a hundred years the emphasis has always been on discovery, on experiment and invention. He was the greatest scientist who could uncover new facts, who could push back the boundaries of the unknown. There has been an absolute scorn of the one who merely tries to bring order out of the already-accumulated facts, the plethora of undigested discoveries, especially if by a reorganization of the facts already known he has been compelled by sheer logic to draw conclusions different from those already believed. He has been scornfully referred to as a mere "armchair" scientist; and the gibe has been tossed, "What original discoveries has he made?" In all scientific classes and institutions the premium has been placed on discovery, rather than on comprehending what has been already discovered. As J. H. Woodger has expressed it, "Since our biologists are only trained to be good investigators, we can hardly expect them to be good thinkers."[3] The same holds true in geology and in all the other sciences.

A hypothesis is not proved because one or two facts can be found which seem to fit it, not even if a dozen such facts can be accounted for by it. Even when a hypothesis leads to actual discoveries, it is not necessarily verified thereby; for plenty of instances are known in which new discoveries have been made on what afterward proved to be an utterly false clue. The hypothetical method usually leads to the making of new experiments, which in themselves may be all right; but often these experiments prove the original process to be untenable, and so—

[3] J. H. Woodger, "Biological Principles," p. 487. New York: Harcourt, Brace and Company, 1929.

"further investigations lead to further complication of the original hypothesis or to its abandonment for another. Now this is *not* induction, and cannot lead to the discovery of biological [or geological] laws. Hypothesis leads to the discovery of facts, and this encourages the belief that those who practice it are making progress. And so they are; but in discovery, not in interpretation."[4]

In geology it is especially common, so common as to be almost universal, for bias, or mere hypothesis, to be embodied in the very wording of the records of the facts observed in the field. What geological memoir has been written in the last hundred years which did not show the facts in the field as colored by Lyell's and Darwin's spectacles?

From all this it is clear that the intelligent layman dare not trust even the statements of reputed experts, in matters in which any phase of the evolution theory is involved; and what set of facts is wholly clear from such involvement?

But the different classes of scientists are becoming so specialized that each is only a mere layman in all other fields except his own specialty. Even men well trained in one line of science have to take on faith what other scientists claim is the interpretation of the facts in their particular fields. Thus instead of being men of knowledge, they are becoming mere men of faith—of faith in what their fellow scientists claim are the right theories in their fields. It is by thus building on other men's theories or prejudices that the vast edifice of what is called "modern science" (often meaning the evolutionary view of the world) has been built up.

And because of the actual discoveries and accomplishments of natural science, especially in the fields of physics and chemistry, a false and dangerous halo has been thrown around any notion in theoretical biology or geology which claims to be the "facts" about the past history of the world or of the plants and animals upon it. Apparently anything and everything which can masquerade under the protecting aegis of

[4] Id., pp. 323, 324.

"science" will be accepted in plain contradiction to the declarations of the Bible. If the Bible is shown to contradict it, then so much the worse for the Bible.

Often in the past, men have been imposed upon and led into anti-Christian behavior by leaders who pretended to have knowledge contrary to the revealed will of God; but there was never more danger of being thus imposed upon than there is today. And from the prophecy of Revelation 13:13, 14, it does not appear that the danger will at all decrease in the future, as we near the end of time. For there can be no doubt in my mind that these false theories about the beginning of the world will play a very large part in the final delusions which take the world captive, as portrayed in Revelation 13 and 14.

III

I shall have more to say along this line presently. But before doing so, I want to clear the way by considering the two other interpretations of Genesis 1 which have been held in the name of harmonizing the record of creation with the fossils. These are the pre-Edenic ruin theory, and the day-age theory.

So far as I can see, there are only three possible ways of equating the fossiliferous records with the creation of Genesis. Let us list them all here together, so as to compare them.

1. The pre-Edenic ruin theory places the fossils *before* the creation of the six days.

2. The day-age theory places the fossils *along with* or side by side with the six days, stretching the "days" out to any length supposed to be required by the fossil evidence.

3. The flood theory places the fossils *after* the creation, or at the time of the flood.

Thus one theory makes the fossils *before,* another *during,* and the other *after* the creation. And nothing else would seem

to be possible, so far as those are concerned who have any remaining respect for the Genesis account as coming from God. Of course, the out-and-out evolutionist does not look upon the creation of Genesis as anything more than a beautiful myth or an allegory.

IV

The pre-Edenic ruin theory is also sometimes called the ruin and reconstruction theory. I have placed it here first, not because it is the oldest, for it is younger than the others, having been suggested first by some Scotch ministers about the year 1810. The theory of many successive catastrophes was being taught by the geologists, and I suppose these Scotch Presbyterian ministers thought that by their theory of a ruin before the creation week of Genesis, they could ignore the fossils entirely and not have to worry about when they were formed.

In the early part of the nineteenth century this theory was quite popular. With the rise of Lyell's geology and the modern biological sciences, it went into eclipse for several decades; but it was revived a generation or so ago by C. I. Scofield and others, chiefly among people who know nothing firsthand about geology. As it is the theory taught in the notes of the Scofield Bible,* it is now very aggressively held by many who are emphatic in calling themselves fundamentalists, and who seem to regard the notes of Mr. Scofield as on a par with the Bible itself.

This ruin theory is sometimes called the interval theory, because it seeks to have an interval or break in the second verse of the Bible, and would have this verse translated, "And the earth *became* waste and void," though of course there is

* The early Reformers had some sad experiences with editions of the Bible with "explanatory" notes. They found that such notes tended to have an unfair and perverting influence on the readers; so they all finally abandoned them. The Roman church does not object to its members' reading the Bible, provided it is one with the Catholic "notes."

not the slightest authority in the field of Hebrew scholarship for any such translation. It also tries to put into the adjectives "waste" and "void" meanings which the original words do not carry, the meaning of the Hebrew words being merely that the earth was still empty, and had not yet been stocked with plant and animal life, and had not yet even been separated into ocean and dry land. The modern Jewish version gives "unformed and void," the latter term of course not meaning anything like "desolate," but merely "empty." The Greek Septuagint translates the Hebrew by words which mean "invisible and unfurnished." It should be stated with positiveness that there is nothing in the original to give a hint of a ruin or a desolation of some previously inhabited world. Such an idea seems to hark back to the "chaos" of the early Greek fathers, which was a wholly pagan notion, adopted by the mediating Gnostics in exactly the same spirit as some modern theologians want their theology to harmonize with the evolution theory.

Besides the slender or imaginary textual foundation for this ruin theory, there are other very serious theological objections to it, also some more strictly scientific, though it is not always easy to separate them into these two classes.

The first theological objection to this view is that it makes suffering and death among the animals prevail for long ages before man's sin; for it would be idle to deny that suffering and death must have been the universal lot of the animal world for long periods before there was a man on earth, according to this theory. And it is only by much theological twisting that such a state of things can be accounted for. When I once suggested to the leading English advocate of this view that perhaps there may have been some human beings also back there, before the present Adamic race was created, he admitted that this might be possible. But how can we think of human beings back in that pre-Edenic world, living and sinning and dying without any Saviour?

The apostle Peter speaks of "the times of restoration of all things" (Acts 3:21, A. R. V.), as the hope set before God's people. What would this "restoration of all things" be like on the basis of the evolution theory, or even on the basis of this ruin theory? It is little short of blasphemy to invent a theory which thus makes meaningless some of the most precious promises of the Bible.

It is contrary to all our ideas of the Creator's justice and benevolence for us to say that there were cruelty, treachery, and death even among the animals for long ages before man was created. The present reign of cruelty and death among the animals we can readily account for as having come about through the derangement of all nature by man's sin; for man had been placed over nature as its king, and when he went astray, God rightly caused all nature to partake with him in his fall, and to testify by many sad object lessons the inevitable results of sin and rebellion. But there can be no justification for suffering and death among the animals before man's fall. To place the cause of it back on Satan, as the first ruler of this world, is simply to add more and more imaginary theories to eke out the collapse of the first one. Anything could be proved by adding more and more imaginary conditions.

At the close of the week of creation, the record is: "God saw everything that He had made, and, behold, it was very good." Gen. 1:31. To me is seems preposterous to think that God could make this declaration if, at this very time, as this ruin theory declares, there were great numbers of skulls and skeletons of dead animals scattered around over all the continents, and uncounted millions of other organic remains buried in the rocks of every land. The two ideas just don't fit at all. Indeed, I cannot see how it could even be *truthful* for the Creator to ignore all these things, or to pronounce these evidences of death and destruction "very good."

My third theological objection is based on the wording of the fourth commandment: "In six days the Lord made heaven and earth, the sea, and all that in them is." Ex. 20:11. Uncounted millions of fossils were in the rocks of all the earth at the time this was proclaimed from Sinai. How could this language be true, if all these dead skulls and skeletons belong, not to the present order of creation, but to a previous one, with which the six days of creation week had nothing to do? We may admit that the men and other creatures now living were created *in potentia* in the six days of creation week; so there is no difficulty on this point. But it is wholly contrary to objective fact to make a statement like this in the fourth commandment, *"and all that in them is,"* if this ruin theory is true.

Then there are also important scientific objections to this theory. Perhaps I should call them religio-scientific; for it is difficult to separate religious from scientific ideas when we deal with such subjects as the flood and creation, or with any of the problems connected with the evolution theory.

My first scientific objection to the ruin theory is that its advocates seem to accept at full face value all the preposterous claims of the evolutionary geologists that they are able to *date* the fossiliferous rocks and set them off in a true chronological order. Indeed, when we go into the history of these ideas, we find that it was because the theologians of a century or more ago accepted the wild claims of Cuvier and Lyell about the *differential dating* of the fossiliferous rocks, that this ruin-and-reconstruction theory was invented or adopted in the first place. But in our day, since we have detected the absurd methods of reasoning in circles for this evolutionary scheme, by which the strata are first dated by their contained fossils and then the fossils are used to build up the chronological backbone of the theory of organic evolution, all well-informed persons have lost confidence in this scheme for the dating of the fossils. And *pari passu,* or in the same way

and to an equal degree, this discrediting of the chronology of the fossils has tended to confirm the view that the flood must have been the cause of the burial of the animals and plants now found as fossils.

I am aware that one of the foremost advocates of the ruin-and-reconstruction theory now repudiates the evolutionary sequence of the fossils. He has repeatedly stated that Price's facts and arguments have destroyed his confidence in the chronology of the fossils; he thinks that they were probably all contemporary with one another, though he still thinks that these pre-Edenic creatures must have occupied the earth (previous to their destruction) for a long time.

But it is exceedingly difficult for me to see what possible reason such a person can have for refusing to accept the flood as the cause of the burial of the fossils. It has long been recognized by scientists that the only strong scientific reason for rejecting the flood theory has been the supposed fact that the fossils did not live contemporaneously in the same world, but in a long series of ages strung out over millions of years. But if the fossils actually lived contemporaneously, it would seem like sheer perversity to say that the flood did absolutely nothing in the way of piling up sedimentary deposits and killing off the animals and plants. That is, why should we be asked to assign the fossils to a ruin which is never once expressly mentioned in the Bible, instead of assigning them to the flood of Noah, which is so clearly and fully described in the Bible? The latter is something which is explicitly described in considerable detail, whereas the former can be read into the record only between the lines and by far-fetched inference.

My second scientific objection to the ruin theory is that it is quite impossible to show any clear dividing line between the animals which were cut off by this pre-Edenic ruin and those which must have been destroyed by the flood. If we admit that a universal flood did occur, brought by God

expressly to "destroy all flesh, wherein is the breath of life, from under heaven" (Gen. 6:17), it is going to be very difficult to convince people with ordinary common sense that this flood left nothing that we can put our finger on in the way of stratified deposits or buried fossils; but that *all* these deposits and fossils must be assigned to the preceding ruin.

All safe or trustworthy research into the long past history of our earth must always proceed from the present backward into the past, from the known to the less known, as is well recognized in all modern archeological work. When we proceed by this method, and wish to treat the Bible records of the earth's past with any respect or decency, we encounter the account of the flood of Noah; and common sense tells us that this cataclysm must have done an immense amount of geological work, in the way of shifting vast quantities of gravel, sand, and clay, as well as in the killing off of species and burying them in these deposits. And it is only by purely arbitrary methods, or by some supernatural knowledge not available to ordinary mortals, that the advocates of the ruin theory can assure us that Noah's flood *left no records of its work,* but that the previous ruin *did everything* of this sort which we find around over the earth.

My final scientific objection to this pre-Edenic ruin theory is based on the well-known fact that thousands of kinds of fossils, both of plants and of animals, seem identical with kinds now living in various parts of the world. All the great orders and families of modern plants and animals have their representative fossils somewhere in the rocks. And in vast numbers of instances it takes a finical expert to distinguish the fossil kinds from the modern, except that the fossils usually seem more thrifty and larger than the modern ones.

Now it seems quite incredible that we have to believe (under this ruin theory) that these modern kinds are not the lineal descendants of the kinds found in the rocks which

look so much like them; but that all these fossil kinds belong to a phantom world which was absolutely wiped out of existence, leaving no possible descendants; that afterward the Creator made others which were exact duplicates of those buried as fossils, and that the modern ones are the descendants of these re-created duplicates.

I confess I would not know how to argue with a man who persisted in maintaining a theory like that.

In closing this part of the subject, I wish to present some statements from J. Oliver Buswell, former president of Wheaton College, Illinois, in rejecting this ruin theory:

"Our objections to this theory are (1) that it rests upon not one single grain of evidence, and (2) that it was invented in order to harmonize geology with the Scripture, and not simply to interpret the Scripture as it stands."[5]

V

The second method of attempting to harmonize the fossil record with the Genesis account of creation, is what I have called the day-age theory. On the basis of this theory the "days" mentioned in Genesis are to be understood in a figurative, or secondary, sense, as indefinitely long periods of time; and the theory says that if we look at the record of creation in this way, these "days" of creation can be shown to correspond to the geological "ages" of the geologists.

This theory seems to have been first suggested by Hugh Miller, the popular writer on geology, who died by shooting himself in 1856, but who had attracted attention as a writer on geological subjects about twenty years previously. The day-age theory rapidly became popular, and was advocated by such "harmonizers" of Genesis and geology as W. E. Gladstone and the Duke of Argyll, and by such scientists as James D. Dana and Sir William Dawson.

[5] J. Oliver Buswell, "Length of the Creative Days," *Christian Faith and Life*, p. 123.

There are plenty of objections to this theory also. By admitting that the "days" of creation week were long periods of time, we take all meaning out of the Sabbath, and are in imminent danger of playing fast and loose with all the rest of the Bible as well. Indeed, the history of the past century makes it very clear that this day-age theory was merely the camel's head of the evolution doctrine, which under the prestige of all the leaders in the scientific and the religious world, worked its way into the Christian tent, and in our day has about taken full possession. Moreover, it is not merely a stretching out of the days that has to be done to make them fit the geological timetable; but in the Genesis record the land vegetation came about on the third day, and the swarms of water creatures only on the fifth day, whereas in the geological order, there were millions of years of sea life before any land life appeared, and indeed the Devonian period, or age of fishes, preceded the Carboniferous period, or the age of land vegetation. Gladstone learned of many other ways in which the Genesis record and the geological record do not make any reasonable fit, when he got into his debate with Huxley, a discussion which was carried on through some of the English magazines and which did so much to promote the rapid triumph of the evolution doctrine during the closing decades of the nineteenth century.

We need not reproduce any further arguments against this day-age theory here. For the larger part of an ordinary lifetime I have been writing books in refutation of the reality of these geological "ages," and against their reliability as a scientific history of the earth. If anyone can read these books and still have confidence in the magic skill of paleontologists to differentiate the fossils off in reliable sequences, I shall not say that he is hopeless, but I must remark that nothing which I could say here would impress him. So we may dismiss this day-age theory of trying to harmonize Genesis with the findings of geology.

VI

The third method of seeking a harmony between geology and Genesis is by what has so frequently been called the flood theory. But few words more are called for here.

Christians believe in the reality of a flood, because it is stated in the Bible. But a universal cataclysm must always be a theory, so far as geology is concerned. Of course, it is based on evidences; I have given some of them in some of the preceding pages, also in several of my other books. I believe that these evidences are sufficient to prove the reality of some such world disaster in the long ago. But it must always be a mere act of faith by which we make this world disaster, as evidenced by the rocks and fossils, the reverse side of the medal of which the flood of Genesis constitutes the front or the face. Thus it must always be only a theory by which we say that the facts of the rocks fit the Genesis record of a flood. But all life is full of such theories, and life could not be lived, we could not step out of the door, or take a train, or meet an appointment, without confronting the need of just about such theories every day in the year. Least of all can we ever make any practical application of our religion to our everyday life without myriads of such theories, or "acts of faith," which thus become an indispensable part of every Christian life.

VII

Forty years ago, when I was first confronted with the problems of geology, I had to make a choice with respect to how the fossils are to be interpreted. At that time, I had these same three alternatives before me: I had a very brief theological statement by someone whose name I have forgotten, that advocated the ruin-and-reconstruction theory. I had several seemingly learned treatises which advocated the day-age theory. *But I did not have anything, and could not*

find by my utmost searching, any work of any size or character which undertook to show how the facts of geology are in harmony with the flood of Genesis. I have since learned that there were one or two very obscure booklets around the middle of the nineteenth century which taught this view, though without any of the great wealth of facts and arguments which we now possess. I have also learned since that the flood theory had a long and honorable history, and that for a full hundred years, from 1700 to 1800, roughly speaking, it was *essentially the only scientific view* of the world which held the respect of educated Christians. But at the time of which I speak I was alone with my problem. I had plenty of evolutionary books. I had almost tons of geological documents, government reports, memoirs, and monographs on special geological topics. And I had my Bible. How were they all to be understood so as to make good sense?

Fortunately, I had also that wonderful book, "Patriarchs and Prophets," by Ellen G. White, a commentary on the first part of the Old Testament. In this I found some revealing word pictures of the Edenic beginning of the world, of the fall and the world apostasy, and of the flood. I found also some statements which *seemed* to indicate that the flood should be regarded as the cause of the geological changes. I did not discount these statements; but still it was not always easy to see *how* the scientific facts ought to be understood. For so strong and plausible is the scientific argument made by professedly learned men, that I remember that on three distinct occasions I said to myself: "There must be something to these long geological ages." And if I had not discovered such facts as the multiplied examples of "deceptive conformities" and a few examples (then known) of so-called large areas showing the reverse order of the fossils, I don't know where I would have been today.

And I wish that my fellow Adventists, who are probably about the only ones who will ever read this book, could get a

picture of the world today, with respect to these problems. For there are multiplied thousands of young men and young women throughout the world who do not have even the slender equipment I had with which to meet these problems, problems of transcendent importance which every intelligent person must meet somehow, if he is to be honest with himself and with the world around him.

From Ireland to Singapore, from Hammerfest to Tasmania, no less than from Maine to California, the average young man or young woman passes along through grade school and high school, perhaps on through college; and on every side he is surrounded by one uniform testimony, by textbook, by magazine and newspaper, by radio, as well as by the statements of all his teachers, that the world is uncounted millions of years old; that plants and animals have existed on this world for uncounted millions of years and in an order of sequence during all this time which geologists have studied out and know accurately; and man himself has existed for a hundred thousand years, perhaps for a million. And although the more candid will acknowledge that man's origin by natural process *via* the animal route has not been actually demonstrated, yet they claim that it is by far the most reasonable view.

And how is this picture going to change? I mean, how is it likely that this practically universal acceptance of the geological "ages" and of something like the evolution theory is going to change?

I am not here intending to dwell on the effect which this world-wide acceptance of these views, with the consequent loss of faith in the Bible, is having and will continue to have upon the morals and the life of the world. I mean only its effect upon the views which we as a people hold, such as the belief in the Sabbath and the doctrine of the second coming of Christ. Is there any probability that the situation will be different in ten years, or in fifty years?—assuming that pro-

bationary time will last that long, which I, for one, refuse to believe possible.

One might expect the educated pagans of China, India, or Japan to take kindly to this view of the ancient world, and the view of man's naturalistic origin through long ages. The Roman church, whose boast is that she never changes, has long ago adjusted itself to these evolutionary views: "officially," the church refuses to pronounce on the problem involved; her people may believe what they like on such matters as the great age of the world; though of course no good Catholic will admit that the Virgin Mary could possibly be descended from some primitive apelike human. But it is the great Protestant world which has been most critically affected by these changed views. And it may be worth our while to consider briefly just what these changes mean to the great mass of Protestants, not only in the United States, but throughout the entire civilized world.

VIII

In the books of Daniel and the Revelation and the writings of Ellen G. White we have some very definite pictures of the situation which the true people of God are to meet just before the second coming. The powers represented under the figures of the dragon, the beast, and the false prophet are predicted as combining against God's people in a campaign of persecution, trying to compel them to forsake their allegiance and obedience to Jehovah, and to conform to the decrees of man-made origin. The people of God in those closing hours of probation are characterized as those who keep the commandments of God and the faith of Jesus. Rev. 14:12; 12:17. And we believe that the observance of the Sabbath, the memorial of a literal creation, is one of the items thus described.

Not much is spoken of in these prophecies about the pagan powers during these closing hours of time. The

Catholic Church is frequently brought into the picture, under the figure of the beast, meaning the leopard beast of Revelation 13 and related scriptures. But the center of the stage in the description in the book of Revelation portraying the final conflict, is occupied by a strange new power under the symbol of a youthful, lamblike wild beast which arises amid quietness after the long period of the persecution of the Middle Ages, and presently seems to become the dominating power of the whole world, though it works in close connection and collaboration with both the dragon and the leopard beast. This wild beast from the land, or the two-horned beast of Revelation 13:11-17, is pictured as causing all the earth to worship the first beast, or the Roman church. In this connection an "image of the beast" is made; life is put into it; and together all these powers unite to compel all persons without exception to receive a mark or sign of allegiance to the first beast, or the Roman church. And at the same time God sends a message to the entire world, threatening with the most horrible punishment all who thus yield obedience to the commands of the united powers of earth.

Such is the prophetic picture. It remains for us to translate these figures into modern realities.

It is not difficult to identify the dragon as symbolizing the formally pagan powers of earth—of which there are more now than there were a generation ago. Nor is it difficult to identify the leopard beast as representing the Roman Catholic powers. In another aspect of the case, we may identify the dragon as symbolizing all those powers of brute force and terror which the evil one has employed and will employ against the people of God, while the leopard beast symbolizes those seductive doctrines of false theology which emanate from and have always been associated with the Roman church.

But what is it that is symbolized by the two-horned beast? and what by the image which the latter makes and causes the world to worship?

The image is undoubtedly a form of union of church and state which will yet be formed, or which is even now in process of formation, which will be like that union of the ecclesiastical with the secular powers of earth which dominated the civilized world during the long night of the Dark Ages. This much is perfectly clear, and needs no proof for those who have followed me thus far.

But we need to note that the two-horned beast is also spoken of as the false prophet (Rev. 19:20; 16:13; 13:11-14), from which we infer that its deceptive and seductive teachings are outstanding characteristics. We are convinced that the Protestant portion of the world is somehow designated under this head; though I shall not take the time here to give the detailed proof. At any rate, it is easy to see that this is the part of the world which is left when the pagan and the Roman portions are already accounted for.

IX

But for more than one generation the entire Protestant world has been in a turmoil of discussion about the relation between the Bible and the book of nature—as to which is the supreme authority. That the Bible is out of harmony with the current teachings of so-called "science" regarding such matters as the age of the world, the origin of man, and the meaning of the Sabbath as a memorial of a literal creation, is obvious to every honest mind. Which are we to trust? Which shall we take as the final arbiter, the final authority? Sad to say, the overwhelming majority of those who call themselves Protestants *have already decided all these questions* by accepting the alleged teachings of science as superior to the Bible on all those questions about origins, or, indeed, about any and every problem concerning God and His relationship to man, whenever the Bible and this view of nature happen to come into conflict. And it is quite incredible that

this profound change in the thinking of the entire Protestant world does not have its influence in shaping up matters for the final conflict between good and evil.

Now the Sabbath was designed to help all men in all matters of this nature, that is, in regard to all the problems about the origin of the world, or about the relation of the present laws and processes of nature to the ways or processes by which the world came into existence. For the Sabbath is a memorial of a *completed* creation, and it was designed to keep forever before us the profoundly important truth that the original creation was accomplished by processes now no longer going on. Thus the observance of the Sabbath by God's obedient people in the last days of conflict will be a weekly protest against the commonly accepted theories of science that the present is the measure of the past and the measure of all the past, theories which have been accepted by essentially all the Protestant world. Hence inevitably the Sabbath *must become the sign or symbol of one side* in the coming conflict, and the disregard of the Sabbath will become the sign or "mark" of those who do not thus believe, or who have accepted the "scientific" view of the world, or, in brief, the evolutionary view of the world. For the evolutionary view of the world and the Sabbath are antagonistic; if one is true, the other must be false; both cannot be entertained by the same mind at the same time; they are mutually exclusive.

From all this it becomes clear that the impending conflict before the church and the world is bound to be influenced by the methods of interpreting nature and their relationship to the Bible. The problem will be: Which is of paramount authority, the Bible, or man's interpretation of nature, in all these matters about the origin of things and man's relationship to these origins? The Sabbath of the Bible points in one direction; the teachings of so-called "science" point in the opposite direction. Which are we to follow?

Right here we need to remember those important words

which have been before the world now for more than half a century, but which are becoming vindicated *as prophecy* with every passing year:

"A day of great intellectual darkness has been shown to be favorable to the success of the Papacy. It will yet be demonstrated that a day of great intellectual light is equally favorable for its success. In past ages, when men were without God's word, and without the knowledge of the truth, their eyes were blindfolded, and thousands were ensnared, not seeing the net spread for their feet. In this generation there are many whose eyes become dazzled by the glare of human speculations, 'science falsely so called;' they discern not the net, and walk into it as readily as if blindfolded. God designed that man's intellectual powers should be held as a gift from his Maker, and should be employed in the service of truth and righteousness; but when pride and ambition are cherished, and men exalt their own theories above the word of God, then intelligence can accomplish greater harm than ignorance. Thus the false science of the present day, which undermines faith in the Bible, will prove as successful in preparing the way for the acceptance of the Papacy, with its pleasing forms, as did the withholding of knowledge in opening the way for its aggrandizement in the Dark Ages."[6]

Now I do not profess to know all that is involved in the statement made in this last sentence. I cannot tell exactly how it is to be fulfilled. But if we are to take this prediction at its face value, there are certain facts which we have a right to infer from it.

The "false science" here referred to obviously means the evolution theory or the entire evolution philosophy. Now this does not consist in a theory that our present one-toed horse is descended from an ancestor of three toes, or a more primitive "horse" of five toes. It does not consist in the view that *Pithecanthropus* was a half-evolved man rather than a gibbon or a degenerate human being. It does not even consist in some theory about the origin of species, in spite of the fact that this question was discussed with much heat and little

[6] Mrs. Ellen G. White, "The Great Controversy," pp. 572, 573.

light by our parents and our great-grandparents. These are mere details, some of them of little importance.

It is highly important for us to understand that the evolution theory in its broadest aspects is a theory of thoroughgoing "naturalism" projected back to the very beginning of things. It is the doctrine that "all things continue as they were from the beginning of the creation." 2 Peter 3:4. It is the view that the present order of nature, its laws and processes, on the land and in the sea and air, has always prevailed in the past, and that by projecting this present order backward far enough we can arrive at a reasonable and "natural" explanation of how all things, including man and all the animals and plants, originated in the first place. Thus we can arrive at the "method of creation," which is thus only a glorified form of the present natural law.

But the Sabbath is squarely against all this. It was given, not merely to remind us of the fact of creation, but also to remind us that creation was completed at some point in the past and is not now going on. Thus the Sabbath is in its very essence a perpetual protest against any such philosophy as that of evolution, which is the "false science" referred to in the above-given quotation. Obviously, then, the *Sabbath must become the very center of the dispute of the last days,* as pictured in this quotation. This is inevitable. And the "pleasing forms" of the Papacy, which are referred to, must be something in opposition to the central idea of creation, of which the Sabbath is the emblem and the sign or seal. And the quotation given above says that the evolution doctrine, or "the false science of the present day," is going to prepare the modern Protestant world to accept whatever the Papacy has to offer as a substitute for, or a counter institution to, the Sabbath, the two thus becoming the rival badges or "marks" of their respective adherents.

And all this brings us to that other prediction, given in 1847, now nearly a century old, that just before the actual

end, the people of God are to go forth and proclaim the Sabbath "more fully."[7] It ought to be clear that we have now actually reached the time here spoken of. The nations certainly are now "angry;" yet they are being held in check in a measure, so far as God's work is concerned, until the work for this time can be fully completed. But increased light has recently been shining upon the Sabbath, showing its profound importance for our day, and for the time just before us. And at such a time the people of God are to have a special endowment of the Holy Spirit, as they go forth to proclaim the Sabbath "more fully."

In conclusion let me say that very few among us yet understand the beauty and the simplicity of the Sabbath as a sign of a literal creation, and a protest against all false ideas along these lines. We need to reconsider these matters in the light of the facts now available from God's "oldest testament," the book of nature.

If no gospel worker can proclaim the truth about the Messiah without a good knowledge of the Old Testament, surely it follows that no gospel worker of our day can proclaim the message about creation (Rev. 14:7), without a correct view of the relationship between the present order of nature or natural law and the primal creation, a relationship which the Sabbath was designed to commemorate, and which the evolution theory denies. Only thus, it seems to me, can we as Adventists go forth to proclaim the Sabbath "more fully."

Let me close with some other statements which may take on new meaning in this connection:

"The whole natural world is designed to be an interpreter of the things of God. . . . The most effective way to teach the heathen who know not God, is through His works. In this way, far more readily than by any other method, they can be made to realize the difference

[7] Mrs. Ellen G. White, "Early Writings," pp. 33, 85.

between their idols, the works of their own hands, and the true God, the Maker of heaven and earth. . . . There is a simplicity and purity in these lessons direct from nature that makes them of the highest value to others besides the heathen."[8]

Surely it is for an age like this, for the multiplied educated "heathen" of America and Europe, that the Sabbath reform was designed, with a timeliness that must make every thoughtful person wonder and admire.

[8] Mrs. Ellen G. White, "Counsels to Teachers," p. 186.

Appendix

Note 1

Regarding the large number of schemes of relativity which are now before the world, it should be remembered that these schemes are only a few out of the many more such inventions which may be expected. For there is no unique method of stating the physical relations of the molecular and atomic structure of the universe, any more than there is one and only one way of stating the relationships of the larger parts of the universe. All the modernly known facts of the solar system could very probably be stated in terms of the Ptolemaic astronomy, by making the necessary assumptions.

The following statements will illustrate what I mean:

"Clerk Maxwell pointed out long ago that an infinity of hidden mechanisms can be imagined, all of which will produce a given motion of the observable parts of a dynamical system. . . . There is probably no unique physical solution of the problem of atomic structure."—*A. E. Ruark and H. C. Urey, "Atoms, Molecules, and Quanta," p. 67, 1930.*

G. B. Halsted, in the introductory note to his translation of H. Poincaré's "Foundations of Science," quotes this eminent French scientist as affirming: "If therefore a phenomenon admits of a complete mechanical explanation, it will admit of an infinity of others which will account equally well for all the peculiarities disclosed by experiment.' The scheme of laws of nature so largely due to Newton is merely one of an infinite number of conceivable rational schemes for helping us master and make experience."—*Page x.*

Also the following from Louis T. More: "As there is always one adequate theory, so there are also an indefinite number of other mechanical theories which will, so far as our minds are concerned, satisfy all the requirements of the case."—*"The Limitations of Science," p. 18.*

Note 2

Sir Arthur S. Eddington gives us the following: "Thus the ultimate concepts of physics are of a nature which must be left undefined; we may describe how they behave, but we cannot state what they *are* in any terms with which the mind is familiar."—*Quoted by J. H. Woodger, "Biological Principles," p. 71.*

And the following from Bertrand Russell is also to the point: "It is chiefly through ideas derived from sight that physicists have been

led to the modern conception of the atom as a center from which radiations travel. We do not know what happens in the center. The idea that there is a little hard lump there, which *is* the electron or the proton, is an illegitimate intrusion of common-sense notions derived from touch. For aught we know, the atom may consist entirely of the radiations which come out of it. It is useless to argue that radiations cannot come out of nothing. We know that they come, and they do not become any more really intelligible by being supposed to come out of a little lump."—*Quoted by J. H. Woodger, "Biological Principles," p. 81.*

Since this is good sense and truthful science, I do not see why we must continue to talk about the wonderful "properties" of the many entities which are said to compose the "nucleus" of the atom, and the amazing results which would follow if we could only succeed in "smashing the atom." All this seems to me only materialistic propaganda, to be rejected by every intelligent Christian. Similarly the latter refuses to admit that electricity is just one of the manifestations of the "properties" of matter, just as long ago he refused to say that "life" is one of the "properties" of matter. Nor can he think of the "entelechy" of the vitalists as anything but an abstraction, a mere mental invention, something which is not one whit better than the unknown god worshiped by the ancient Athenians. Today there is need for some modern Paul to proclaim to the multitudes who bow before their little gods of "life" and "electricity" and a dozen others: "Whom therefore ye ignorantly worship, Him declare I unto you." Acts 17:23.

Note 3

A. A. Michelson, whose name will always be connected with the patient, careful observations disproving the existence of an ether throughout space, was born in Poland in 1852, and died in 1931. His observations or experiments were conducted by means of a delicate interferometer mounted on a stone slab floating in mercury, and were prolonged over many years, the last years being in connection with the Mt. Wilson Observatory, Pasadena, California. The tests which he made depend upon the principle that in certain parts of the earth's orbit the light from a distant star would be moving *with* the motion of the earth in its orbit and in certain other parts the light would be moving directly contrary to the earth's motion.

By means of observing the displacement made in the interferometer fringes, investigators thought that a drift through the ether, or a

drift of the ether because of the movement of the earth, could be detected and measured. But the result was always zero. No such ether drift could be detected. The inevitable conclusion was that the ether must be nonexistent.

If there were an ether pervading all space, the earth in its various motions would make an ether wind in the same way that an automobile at top speed makes a wind felt even when the air is stationary. The earth moves at the rate of eighteen miles a second in its motion around the sun. But at one time of day this ether wind would come from one direction and at another time of day it would come from the opposite direction, due to the earth's rotation. And Michelson's interferometer should have made this change of ether drift very clear and plain, if any such ether drift or ether wind actually existed. But Michelson always found a zero effect; there was no such drift, and hence there cannot be any such all-pervading ether.

Note 4

When radioactivity was discovered about twoscore years ago, the heavier elements like uranium were found to be slowly disintegrating, one of the end products being an isotope of lead. From all this it was inevitable that the theorizers would try to work up a method of showing how old the various rock deposits appear to be when calculated by this radioactive method.

It is sometimes claimed that this check agrees with the other methods which have long been used to date the various rock formations. But this radioactive method is full of fallacies, of slipshod methods, and of sheer charlatanry. And no one who has any regard for solid, scientifically proved results, will ever lose any sleep because of the announced results thus obtained.

But the entire subject has too many complications to make it a profitable subject of discussion here.

Note 5

Some years ago a Swedish scientist hit on the plan of counting the alternations shown in the sediments at the bottoms of certain old lakes, in an attempt to find how much time was occupied in the making of these deposits, and by inference and by other comparisons the length of time since the "retreat of the glaciers," which were supposed to have been the origin of the lakes themselves. These alternate layers or rather groups of layers are called *varves*, from a

Swedish word meaning the deposit of a season, whether it be a wet and dry season alternating, or summer and winter. But the varves as now counted are always affirmed to show the *annual* alternations of summer and winter. The summer band or group of laminae are of somewhat coarser texture, often lighter in color, whereas the winter band is finer in texture, and darker. The summer deposits are also thicker than those of the winter. Such is the theory.

I mean that it is a theory without any substantial proof that these sets of varves represent *a year's* deposits. They may be merely different seasons, or different weather alternations.

Furthermore, an additional complication is brought in by attempting to correlate the dates furnished by one locality with those from another, with all the same old pseudoscientific methods of patchwork and guesswork upon which all the earlier "dating" of the other geological deposits was built up.

From all these semiscientific and pseudoscientific methods of counting time, these theorists tell us that probably 15,000 years have elapsed since the last of the glaciers covered these northern lands. But since it is usually said that there were four periods of maximum glaciation, with a corresponding number of warm periods in between, and since man and the modern floras and faunas are declared to have lived before the first of these continental glaciers, the human period is thus extended backward into the dark abysm of time for an immense length.

All this, of course, helps the evolution theory very considerably. Even if there were only *one* glacial period, the length of time since then would still extend to twenty or thirty thousand years, if the varves actually show us the number of years which have since elapsed.

Needless to say, there are far too many uncertainties about this whole matter to inspire one with confidence in the results thus obtained.

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